ROSAT

MISSION INFORMATION AND PLANNING SYSTEM (MIPS)

USER'S GUIDE

DECEMBER 1990

NASA/GSFC
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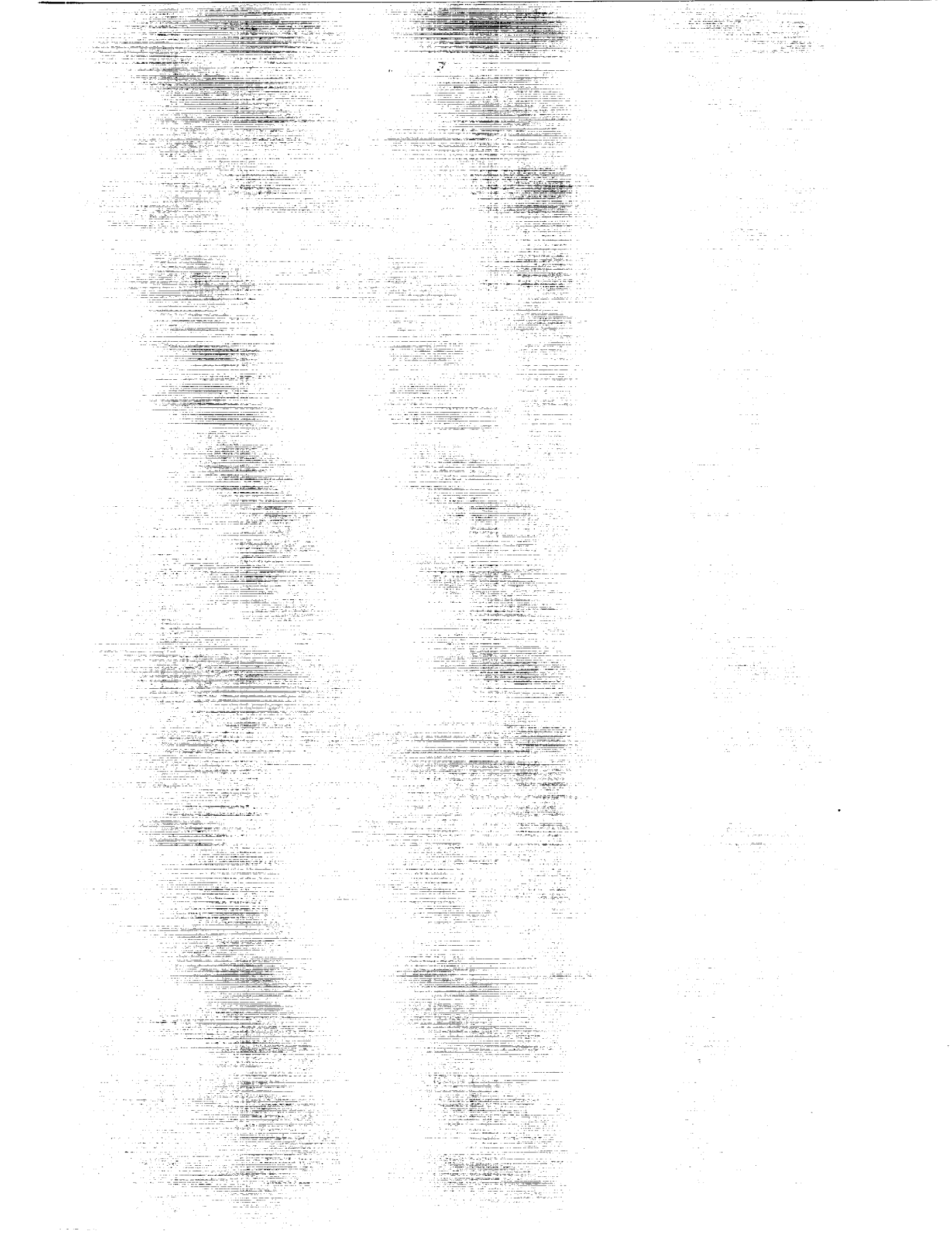

FOREWORD

This document is provided to users of the U.S. ROSAT Science Data Center Mission Information and Planning System (MIPS). Its purpose is to assist users with their interactions with the MIPS system. Every effort has been made by the MIPS team to present this additional information in a clear and easily understandable manner. If questions do arise pertaining to the usage of MIPS, please refer all questions to:

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1. THE ROSAT PROJECT

1.1 INTRODUCTION

The ROSAT Project is a cooperative program between the Federal Republic of Germany, the United States and the United Kingdom. The mission of ROSAT is to advance the science of astrophysics through the study of X-ray emissions from non-solar celestial objects. The study will be performed with an X-ray observatory that initially will survey the sky for X-ray sources and then will point at specific sources for extended periods of time. The ROSAT observatory was designed and is operated by West Germany. The ROSAT Project is managed by the Deutsche Forschungs Anstalt fuer Luft und Raumfahrt (abbrev DLR) on behalf of the Bundes Ministerium Forschung und Technologie (abbrev BMFT). The Max Planck Institut fuer Physik und Astrophysik Istitut fuer Extraterrestrische Physik (MPE) manages the ROSAT Scientific Data Center for the ROSAT Project. The main instrumentation of ROSAT consists of a Wolter type I X-ray telescope with a carousel plane assembly carrying a Position Sensitive Proportional Counter (PSPC) instrument designed and built by West Germany, and a High Resolution Imager (HRI) instrument designed and built by the U.S. The X-ray telescope will be supplemented by an extreme ultraviolet (EUV) telescope with a Wide Field Camera (WFC) instrument designed and built by the United Kingdom. The United States launched the ROSAT observatory on a Delta-2 on June 1, 1990. The satellite is in a near perfect orbit of 584.6 km x 577.8 km and 53.004 degrees inclination.

1.2 MISSION OBJECTIVES

ROSAT will make an all-sky survey of X-ray and extreme ultraviolet (EUV) sources using the German PSPC instrument and the British WFC instrument while in a scan mode during the first six months of its orbital mission. After the sky survey, the mission will be dedicated to detailed measurements of selected X-ray sources employing the PSPC, the HRI, and the WFC in a stationary or pointing mode of spacecraft operation. Data is recorded on board the spacecraft and transmitted to the 15-meter antenna at the German Deep Space Station near Weilheim, Germany. In the scan mode, the spacecraft will maintain the telescope axis approximately normal to the earth (i.e., one spacecraft rotation per orbit). In the pointing mode, the spacecraft will be stabilized on three axes with the telescope pointing to a particular X-ray source for long periods of time (i.e., 103 to 104 seconds). The scientific objectives of the ROSAT mission during the pointed phase include:

- Detection of faint X-ray sources using the PSPC and the HRI, and determination of source locations to within TBD arc second using the HRI.
- Study of the structure of extended X-ray sources, with 20 arc-second resolution using the PSPC, and with 2 arc-second resolution using the HRI.
- Study of the spectra of X-ray sources using the natural energy resolution of the PSPC or a selection of filters with either the PSPC or the HRI.
- Study of the temporal behavior of X-ray sources with high precision time resolution.

The ROSAT mission will provide the United States astrophysics community with the only X-ray astronomical imaging data available between HEAO-2 (end of mission: 1981) and

the Advanced X-ray Astrophysical Facility (AXAF), circa 1995. The development of X-ray astronomy over the past two decades culminated in the first true X-ray telescope for HEAO-2, which continues to provide a repository of data and the direction for future observations. ROSAT will allow the logical and timely continuation of data-gathering along the directions indicated from HEAO-2, and provide new inputs for the observation program of AXAF.

1.3 SPACECRAFT AND INSTRUMENTATION DETAILS

1.3.1 High Resolution Imager

The High Resolution Imager (HRI) instrument is a two-dimensional high resolution imaging detector. The instrument uses a pair of cascaded microchannel plates (MCPs) as an X-ray image converter and photoelectron multiplier, and a crossed wire grid as a two-dimensional position sensitive charge detector. Position determination is accomplished by electron interpolation between the crossed grid wires. The detector provides the arrival time and position of each X-ray event that occurs within the field of view.

The ROSAT HRI is nearly identical to the Einstein Observatory's (EO's) HRI with the replacement of the magnesium fluoride photo cathodes. Typically, a source will have a count rate for ROSAT's HRI of five times that of the EO HRI.

The instrument is capable of high resolution studies of supernova remnants, globular clusters, nearby galaxies, active galaxies, and clusters of galaxies. The detector will generate X-ray images with a field-of-view diameter of 36 arcminutes. The HRI has a spatial resolution of two arcseconds. The angular resolution is 4 arcsec FWHM, and the background count is $3*10^{-3}$ counts/second/arcminute^2. Off-axis the spatial resolution is dominated by the mirror and degrades to 14 arcseconds at the edge of the mirror.

The HRI instrument contains two internal calibration sources: an X-ray source (X-ray response), and a UV calibration system (position response). A fiducial light system is provided for use by the spacecraft aspect system. The HRI calibration system consists of a radioactive X-ray source mounted on the vacuum door and a UV optical system which projects a geometric pattern on the detector face. The X-ray source provides a monitor for the MCP gain characteristics. The UV optical system provides a means of calibrating the HRI position encoding system.

1.3.2 Position Sensitive Proportional Counter

The Position Sensitive Proportional Counter (PSPC) instrument is a conventional multiwire proportional counter with a cathode strip readout scheme for position determination. It has a sensitive area of 8 cm in diameter and operates in an energy range between 0.1 and 2.4 keV. It has an angular resolution of 25 arcsec FWHM and spectral resolution of 0.4 FWHM at 1 keV. There is a gas replenishment and control system to keep the composition and density of the gas constant. The variation in gain due to changes in gas density is thus kept to less than one percent.

The electronics for the PSPC perform the following basic tasks:

- Recognition of X-ray events including:
  - -- Measurements of pulse heights in the different detector electrodes
  - -- Determination of the event time
  - -- Determination of the event energy

-- Calculation of the event position, or formatting of the raw data

- Recognition and rejection of events having the following characteristics:

  -- Events, producing simultaneous signals in anticoincidence counters
  -- Events, outside the energy range
  -- Events, exciting cathode strips not adjacent
  -- Events, exciting more than five cathode strips

The electronics consist basically of the front-end electronics, the mixer, the analog data processing unit, and the digital data processing unit (a microprocessor) with serial interface to the spacecraft. The signal is sent from the PSPC to an analog data processor where the signal pulse height is shaped, and coincidence pulses and background are eliminated. The background count is $2*10^{-5}$ counts/second/arcminute^2 for a typical 200 counts/second background in orbit. The signal, converted to digital, is then passed to a microprocessor which calculates the position, energy, and event time (with a resolution of 120 microseconds). It is expected that a large number of new sources will be discovered and located with an accuracy of one arcminute or better.

2. MISSION PLANNING AND MISSION INFORMATION SUPPORT

2.1 OVERVIEW

The U.S. ROSAT Science Data Center (USRSDC) has been developed to support the U.S. portion of the ROSAT Program. One function of the USRSDC is to provide mission information and proposal support to the U. S. investigators. This is the function that is being addressed by this document and online system. Other functions of the USRSDC include standard data processing of the ROSAT Level 1 products and software systems to analyze the Level 2 products. These areas are addressed by other documents.

The primary task of mission planning and the mission information support function is to assist guest observers in the development of pointed observation proposals for ROSAT. Also as part of this function, target lists for approved pointed observations by U.S. guest observers will then be provided to the International User's Committee. To effectively carry out this task, there have been many activities performed together by the USRSDC and MPE, such as the creation and maintenance of several databases and software packages which will support the mission planning tasks and also provide assistance to the guest observer. The mission planning software will coordinate and manage incoming requests from NASA selected guest observers for observing time on ROSAT instruments. It will provide all necessary information and reports to NASA Headquarters, to the National User Committee, to Max Planck Institute (MPE) and to guest observers. It will directly interface with the West German Mission Planning software at MPE. In addition, the mission planning support staff will extract technical information from proposals at the request of U.S. ROSAT proposal review committees and provide other support including evaluating targets based on possible observing times and viewing windows. The information and reports will be available in an online information system for mission planners. Users may interact with the online information system in order to acquire data concerning the ROSAT instrumentation, approved ROSAT proposals, and related observations on the EINSTEIN and EXOSAT satellites. Guest observers are also provided access to software tools such as the observation time calculation program, and other utilities to assist in proposal preparation. The mission planning and mission information support function is provided to the community by the ROSAT Mission Information and Planning System (MIPS); a schematic diagram of MIPS is shown in Figure 1. MIPS is an integral part of the U.S. ROSAT Science Data Center (USRSDC) at the Goddard Space Flight Center (GSFC) and was developed and implemented in cooperation with the Smithsonian Astrophysical Observatory (SAO).

2.2 MIPS DESCRIPTION

The Mission Information and Planning System (MIPS) is an online information retrieval system devised for the U.S. ROSAT Science Data Center and its users. MIPS was designed by the ROSAT Mission Planning Team at GSFC Code 934. MIPS is intended to support the general scientific community for which this user's guide is intended.

MIPS is a menu-driven system built using the INGRES database management system (DBMS) and its utilities. INGRES is the DBMS chosen by the West Germans at MPE for the support of the ROSAT Project. INGRES is a product of INGRES Corporation of Alameda, California. The current version of INGRES operational on the ROSAT Mission Planning MicroVAX is Release 6.3/01 (VAX VMS/01). The INGRES database administrator is Jeanne Behnke; she can be contacted at (301) 286-8340 if information is required on this product.

Conceptual View of the ROSAT MIPS

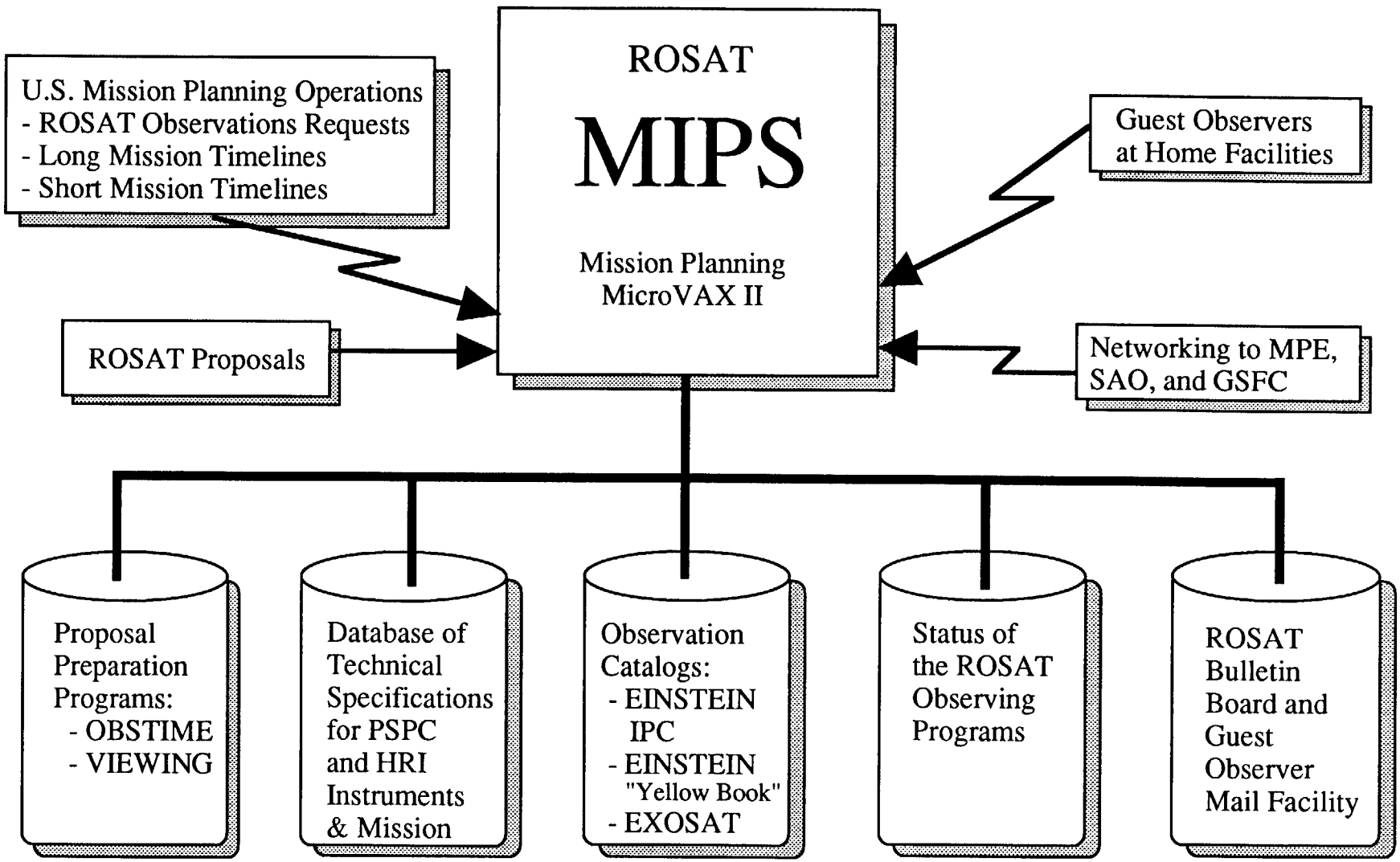

Figure 1

The requirements for MIPS were assessed after collaboration with EINSTEIN investigators at the onset of the GSFC involvement in the ROSAT project. In this evaluation, it was determined that the general user community or guest observers require the following information:

- ROSAT approved targets and selected information from approved proposals
- Ability to formulate a ROSAT proposal for submission
- EINSTEIN sequences and targets
- EXOSAT observations
- Technical specifications for PSPC and HRI
- Ability to calculate exposure times for targets, viewing windows, and coincidences
- Immediate information concerning ROSAT through a bulletin board
- Correspondence between fellow investigators

MIPS is arranged primarily in a menu-driven system providing the user maximum flexibility despite the disparity of user knowledge and equipment. The logical structure of MIPS is presented in Figure 2. There are eight components: HELP, CATALOG ACCESS, MISSION INFORMATION, TOOLS, BULLETIN BOARD, MAIL, and LOG-A-PROPOSAL. At each step, HELP is provided to give users complete support. This user's guide was generated from the actual HELP items available to users within the MIPS system. The CATALOG ACCESS subsystem allows users to gain access to a variety of databases including IPC, EINSTEIN, and EXOSAT. The MISSION INFORMATION subsystem allows users access to ROSAT target information, the mission timelines, etc... The TOOLS subsystem incorporates several scientific applications programs which can be run to assist users in proposal preparation. The BULLETIN BOARD subsystem is an online interactive facility which allows users to submit information and/or messages (pending approval) to all users of the MIPS system. The MAIL facility allows users to mail files back to home facilities or send messages to colleagues. Finally, the LOG-A-PROPOSAL subsystem is an online method of entering proposal information. Subsequent sections of this user's guide describe each of these subsystems and, as previously mentioned, is composed from the online help files. To successfully use MIPS, and the system's menus and screen forms, it is important to read the section on accessing the system (Section 2.4). The user may find it helpful to leave the user's guide open to the tables on pages 15 and 16. These tables will greatly aid in users accessing the system for the first time.

MIPS resides on a Digital Equipment Corporation (DEC) MicroVAX II running VMS 5.3. This MicroVAX is located at the Goddard Space Flight Center in Building 28, Room W220, and is available to users 24 hours per day, seven days per week. This computer is accessible through the NSN and INTERnet networks and is known as the ROSAT node. Access to the MIPS MicroVAX is also available through the GTE TELENET system and through direct dial-in telephone lines.

2.3 ACCESSING THE MIPS MICROVAX

Access to MIPS involves two processes. The first requires the user to make a physical communication link with the ROSAT MicroVAX. The second process is to log into and perform tasks with the MIPS system. There are presently four methods provided to users to make connection to the ROSAT MicroVAX: calling into the GTE TELENET system, using the network access methods of NSN and INTERnet, and calling into the direct dial-in ports to the MicroVAX itself. In the following sections, all user entries are indicated in ***bold italicized*** type; system responses are shown in **bold** type.

ROSAT MIPS Main Menu

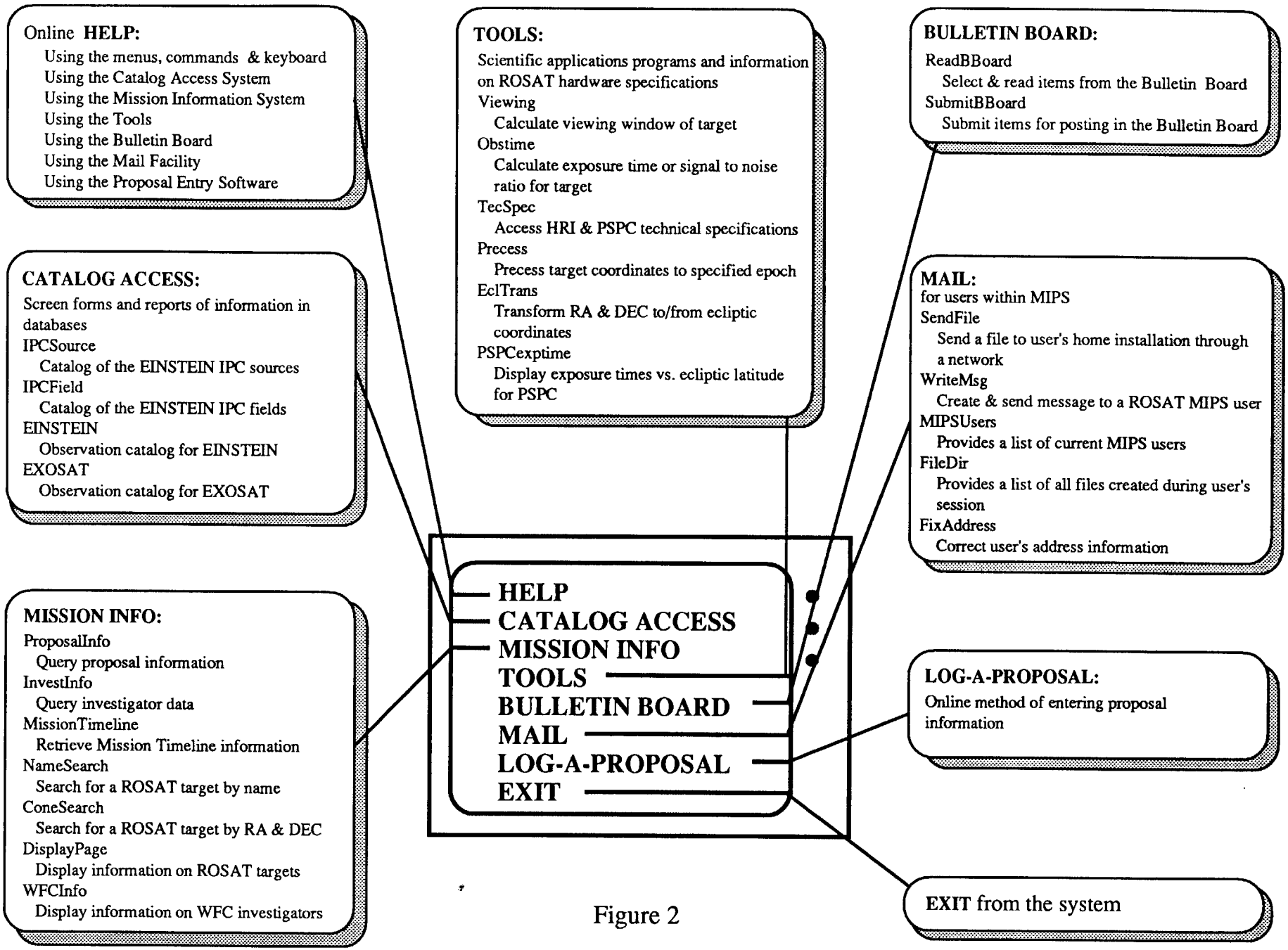

Figure 2

2.3.1 GTE TELENET Access

Direct access to the ROSAT MicroVAX is possible via the GTE TELENET facility. Many of the local area access numbers in major U.S. cities are listed in Appendix B of this document; additional numbers are available from the MIPS staff or by dialing GTE TELENET at 1-800-TELENET. Users interested in using TELENET to access ROSAT MIPS will need to inform the MIPS staff at (301-286-8340). To access the ROSAT MicroVAX computer, users should follow these steps:

- The user must first dial the ***local TELENET access number*** and enter carriage returns (***<CR>***) until the **@** prompt appears.
- Next, the user should enter ***C NASA <CR>*** (in upper case); the system will respond **ready**.
- The user should enter several ***<CR>s*** until the * prompt appears; the user may now enter ***LOGON <CR>*** (in upper case).
- The following interaction should now take place (user entries must be in upper case):

  ENTER USERID> ***<<username>> <CR>*****
  ENTER PASSWORD> ***<<password>> <CR>*****
  ENTER SERVICE> ***ROSAT <CR>***

  ** Note: Contact Jeanne Behnke for the username and password required for TELENET access.

- The user may then need to enter several ***<CR>*** before receiving the ROSAT MicroVAX **USERNAME:** prompt.

2.3.2 Network Access

The ROSAT MicroVAX is presently operational on the GSFC Local Area Computer Network (LACN), which includes connections to the DECnet-based, NASA Science Network (NSN) which operates both the DECNET and TCP/IP protocol. For authorized users, ROSAT can be accessed through DECNET by changing the current host to ROSAT, i.e., ***SET HOST ROSAT.*** or ***SET HOST 6280*** After issuing this command, the user will be prompted for the MicroVAX and should log into the appropriate MIPS account (see Section 2.4). The network protocol used in the INTERnet is Transmission Control Protocol/INTERnet Protocol (TCP/IP). To access the ROSAT MIPS through the INTERnet the user should issue the command: ***TELNET ROSAT.GSFC.NASA.GOV*** or ***TELNET 128.183.10.64.*** After issuing this command, the user will be prompted for the MicroVAX and should log into the appropriate MIPS account (see Section 2.4).

2.3.3 Dial-In Access

Access to the ROSAT MicroVAX via phone line is possible by dialing the appropriate connection number at the Goddard Space Flight Center Switch Network. Users can access the GSFC modem pool at ***301-286-9000***. This phone number is capable of autobaud switching, providing 300-throught 9600-baud service based on the baud rate with which the call originated. Within GSFC, users may access the ROSAT MicroVAX through the ROLM dataline service. This "internal" service provides users not only the standard baud rates but also a 9600 baud rate.

After dialing in and connecting with the GSFC phone system, the user will be prompted with one of two messages from that system: **CALL, DISPLAY, OR MODIFY?** or **ENTER**

NUMBER:. The user must then type ***CALL SISC <CR>***. This mneumonic will connect the user with a bank of phones attached to terminal servers. If a successful connection is made, the user is answered with **CALL COMPLETE**. The user should enter several ***<CR>s*** until the **enter username** prompt appears. The user may now type ***CON(NECT) ROSAT <CR>*** to make the final connection to the ROSAT MicroVAX.

Generally, users do not require any further information to use the GSFC phone system, but some explanation of the DISPLAY and MODIFY commands may be useful. These commands are used to set the characteristics of the user's connection. The user can enter ***DISPLAY CHARACTERISTICS*** for information concerning the line connection, i.e., parity, baud rate, etc. The MODIFY command enables the user to change the terminal characteristics. For example, if after entering ***CALL SISC*** the user is prompted with an error message such as **YOUR PARITY = NONE, CALLED PARTY PARITY = EVEN, CALL ABANDONED**, the user can type ***MODIFY PARITY*** and then would be prompted for the appropriate change. The user can then make the change and would be prompted again for **CALL, DISPLAY OR MODIFY?**. However, when the user's protocol is set up for the ROSAT MicroVAX, no modifications should be necessary. The ROSAT MicroVAX protocol is full duplex, eight bits, no parity, and one stop bit.

After logging off of the ROSAT MicroVAX users will be returned to the terminal server prompt whereupon they should type ***LO <CR>*** again, and disconnect their phone line.

2.4 ACCESSING MIPS

Once a successful connection to the ROSAT MicroVAX has been made, the following steps should be used to access MIPS:

- The user must first sign into the appropriate MicroVAX account. After the system prompts for the **USERNAME:**, the user should type: ***MIPS <CR>***. The system will then respond with a **PASSWORD:** prompt at which time the user should type ***XRAYED <CR>***. The password is not echoed to the terminal screen. The username and password entries do not need to be capitalized.

- Several login messages are displayed after successfully logging into the MIPS account. The user may be asked a few 'YES' or 'NO' questions at this point, pertaining to the continuation of the login process.

- The user is next asked for information about the type of terminal he is using to access MIPS. There are 128 types of terminals that can possibly be defined for MIPS. The first question asked of the user is whether he is using a VT100 or VT100 emulating program. By default, MIPS assumes that he is using a VT100 type of terminal. Therefore, if the user has a this type of terminal, he can bypass reviewing all of the terminal types. Otherwise, the user can list the possible types of terminals, a few at a time. The user should review this list, typing ***<CR>*** to continue on to the next set of options. The user should determine from the list what type of terminal he is on and, after the prompt, he should enter the number of that particular terminal. For example, if the user is on a Hewlett Packard 2626 or is running an HP 2626 emulating program, he should type ***77*** after the prompt. The list of valid terminal types can be found in Appendix C of this document. If the user cannot find the appropriate terminal in this list, he should select the terminal most resembling the one he is using, i.e., an ESPRIT 6515 would be entered as ***50***, a DEC VT220 terminal. Following selection of the appropriate terminal type, the user's session should be running in the proper terminal mode.

- The user is now in MIPS and will view the first screen. The user should type ***<CR>*** to continue on to the next screen.

- The next screen is the username and password screen for access to the MIPS. Generally, a new user would enter his last name in this locate and the system would recognize the entry as being that of a new user. The user is then required to fill out a screen form with his name, address, and network information. The user should refer to Section 2.4.1 for instructions on filling out the ROSAT Guestbook information. A username will then be generated for him and the user will be asked to supply a password. The user is responsible for remembering this level of username and password.

- After supplying a password the user will be prompted to enter either ***M*** for Menu Mode or ***C*** for Command Mode. If the user selects Menu Mode, the ROSAT main menu screen will be displayed. If the user selects Command Mode, the MIPS prompt will be displayed. See section 10 for a list of MIPS commands.

- The NEXT TIME the user calls into the ROSAT MicroVAX, the user should enter the ***MIPS/XRAYED*** combination mentioned previously. However, at the MIPS prompt for username and password, the user should enter the new, MIPS-generated, username and password. If the username is entered inaccurately the user will be prompted to answer the following:
  Are you a new user? [Y/N]
  Do you want to enter your username again? [Y/N]
  What is the username?

- After correctly answering the above questions the user is returned to the MIPS username/password prompt. If the password is entered inaccurately the user is logged off of MIPS.

- When the user selects QUIT on the main menu of the ROSAT MIPS, he will be asked whether to log off (disconnect from) the ROSAT MicroVAX.

Before actually using MIPS, it is very important that the user read through the following sections on PF keys (Section 2.5.1), control keys (Section 2.5.2), and screen form manipulation (Section 2.5.3) in order to successfully navigate through the ROSAT MIPS.

2.4.1 The ROSAT Guestbook

The ROSAT Guestbook is an online user information entry form. Users are requested to enter their own address information for use by the ROSAT Project. This information will be used only for ROSAT Project purposes, including ROSAT proposal preparation. Each time the user accesses MIPS he will need to specify his ROSAT MIPS username and password for access to the database and programs. The first time a user accesses the MIPS system, he will see the Username and Password screen. For this initial time, the user should enter his ***last name*** in the **Username** box on the screen. If the name is completely unique, MIPS will respond **You are not entered into the ROSAT Guestbook**. If the name is similar to other user's names (i.e. SMITH), MIPS will ask **Are you a New User?**. Answering ***Yes*** to this question will place the user into the ROSAT Guestbook screen; answering ***No*** implies that the user has entered his name incorrectly. A combination of the first name initial and the lastname is used to develop a unique MIPS Username. For example, a user named Jeff Mullins might have the MIPS username JMULLINS. A user named George Herbert Walker Bush might have the MIPS username GHBUSH, particularly if there were more than one George Bush using MIPS. *The user should make a note*

of the username and password. If the username/password is later forgotten, the user can contact the MIPS staff to look it up again.

The ROSAT Guestbook screen is displayed in Figure 3. It is important to enter information into this screen as accurately as possible, as this information will be used for mailing important ROSAT communications to the user community. Enter the information into the Guestbook in upper and lowercase, using the tab character as mentioned previously to go from one field to the next. The user can continue tabbing from field to field until all of the information has been entered accurately. When all of the information has been entered, the user selects the ***END*** menu item to continue on into the MIPS system.

If it is necessary to change the address information a user might have entered at a previous date, the user can perform this in the **MAIL** subsystem under item **FIXADDRESS**.

ROSAT
GUEST BOOK

Enter the following information:
(ex. John A. Doe)

Use TAB key to get to the next field
Carriage RETURN to clear field
Ctrl-P to previous field

FIRST NAME	MIDDLE NAME (or initial)	LAST NAME
George	Herbert	Bush

TITLE:	President
DEPARTMENT:	Oval Office
INSTITUTION:	The White House
ADDRESS/STREET:	1600 Pennsylvania Avenue
CITY:	Washington
STATE:	D.C.
COUNTRY:	U.S.A.
ZIP CODE:	20001
PHONE NO:	(202) 555-5555
TELEX NO:	
FAX NO:	

(use PF1 or ESC key to select)
(select END when finished)
(select ABORT to stop MIPS)

Help(PF2) END(PF3) Abort(PF4):

Figure 3. ROSAT GUEST BOOK Screen Form

2.4.2 General Menu Items

This section discusses menu items available in all MIPS menus. These entries are:

HELP -- Is divided into separate menu options. These include:

WhatToDo -	Displays help about the current screen and menu. This describes the overall purpose of the screen, and contains a description of the menu items.
Keys -	Displays a table of the mapping between the function and control keys, and their current definition.

END -- End this menu item and go back to the previous screen form or menu.

QUIT -- Quit out of MIPS entirely. This will give the user the option to log off of the ROSAT MicroVAX at any time without having to go back through all the previous menus.

MAIN -- Return the user back to the Main MIPS selection menu.

The menu items above will always be mapped to the same function key on the keypad in every form for the VT100 and VT220 user and can always be accessed by the function key, even if the item is not currently in view on the menu line If the above items are not in view and there are no function key mappings for the user's terminal, the commands can always be accessed by typing in the above keywords at the menu line prompt.

On forms with lists of items to scroll through, the following items are available:

NEXTPAGE -- Display the next page of help for this screen. Note that this menu command is the same as the SCROLLUP function key.

PREVPAGE -- Display the previous page of help for this screen. Note that this menu command is the same as the SCROLLDOWN function key.

FIND -- Search the text for the prompted word and scroll the text to the next line in which it is found.

TOP -- Display the first page of data or the first screen of the help text. On VT100 and VT200 type terminals, this menu items is mapped to the CONTROL K (^K) key sequence as well.

BOTTOM -- Display the last page of data or the last screen of help text. On VT100 and VT200 type terminals, this menu items is mapped to the CONTROL J (^J) key sequence as well.

2.4.3 Command Mode

Command mode provides the experienced MIPS user a quick way to access certain parts of MIPS. No menus are provided to ther user in command mode. Instead the user is prompted for the information necessary to execute a specific command. To access command mode, the user must first successfully log onto the MIPS system. The user is then prompted to enter ***M*** for Menu mode or ***C*** for Command mode. If the user selects C, the '**MIPS>**' prompt is displayed. The user may enter any one of the following commands: BBOARD, CATALOG, ECLTRANS, OBSTIME, PRECESS, PSPCEXP, VIEWING, or WFCINFO. Each of these commands is discussed in detail in Section 10.

2.5 USING THE KEYBOARD

When executing queries and programs within MIPS, the user has two keyboard/keypad options. The user can either type in the desired menu function in conjunction with the ESCAPE key, or he can use the special function keys. The keyboard and keypad are discussed in the following sections.

2.5.1 PF Keys

The function keys for the VT100 and 200 series terminals are located directly above the numeric keypad and are labeled PF1, PF2, PF3, and PF4. For MIPS the function keys (shown in Table 1) will perform similarly on both keyboards.

Table 1
Function Key Definitions

PF1 (F1)*	MENU KEY	Allows the user to select menu items by typing in the selection.
PF2 (F2)**	HELP	Provides help with the current menu.
PF3 (F3)	END	Returns the user to the previous menu.
PF4 (F4)	QUIT	Logs directly off the MIPS menu mode and places the user in MIPS command mode.

* The MENU key (PF1 or F1) drops the cursor to the menu line at the bottom of the screen. A > character appearing at the end of the menu indicates that more menu items are available. By typing the PF1 or F1 key twice, the additional menu items will appear on the menu line. The menu key provides users the additional capability of entering the first unique characters of the menu item to be executed.

** This key is the HELP (F15) function key at the top of the keypad for VT200 type terminals.

For non-VT100 or 200 series terminals, the MENUKEY is the ESCAPE key. HELP, END, and QUIT are not mapped to keypad keys and must therefore be typed in at the menu item line.

2.5.2 Control Keys

Screen forms are the electronic equivalent of paper forms. They can be used to enter data or to display data. How the user navigates a screen form depends on what kind of terminal is used. Table 2 lists the control keys used to navigate through the screen forms. The first column indicates a function to be performed. For example, 'menu' in the first line indicates the activity the user performs to get to the menu command line at the bottom of the screen form. Looking across the list, the user determines that he can get to the menu line by using the PF1 key if he is on a VT100 or a VT220 or the ESCAPE key for any other terminal type. Likewise, to get to the next field on the screen form, the user presses the TAB key; to get to a 'previous field' on the screen form, the user can type CTRL/P (CONTROL key and P key simultaneously). An explanation of the control keys follow on the next few pages.

Table 2
Control Key Definitions

COMMAND	VT100	VT220	OTHER
NAVIGATING:			
menu	PF1	PF1	ESC
nextfield	TAB	TAB	TAB
previousfield	CTRL/P	CTRL/P	CTRL/P
nextword	CTRL/U	CTRL/U	CTRL/B
previousword	CTRL/R	CTRL/R	CTRL/R
leftchar	<--	<--	CTRL/H
rightchar	-->	-->	CTRL/L
downline	Down Arrow	Down Arrow	CTRL/J
upline	Up Arrow	Up Arrow	CTRL/K
newrow	CTRL/N	CTRL/N	CTRL/N
scrollup	keypad ','	Next Screen	CTRL/F
scrolldown	keypad '-'	Prev Screen	CTRL/G
scrollleft	CTRL/L	CTRL/L	CTRL/O
scrollright	CTRL/H	CTRL/H	CTRL/U
ENTERING DATA:			
mode	CTRL/E	INSERT HERE	CTRL/E
deletechar	CTRL/D	REMOVE	CTRL/D
rubout	DEL	DEL	DEL
edit mode	CTRL/V	CTRL/V	CTRL/V
clearrest	RETURN	RETURN	RETURN
duplicate	CTRL/A	CTRL/A	CTRL/A
REFRESHING SCREEN:			
clear	CTRL/X	CTRL/X	CTRL/X
redraw	CTRL/W	CTRL/W	CTRL/W

NOTE: Some of these features may not be enabled on the user's terminal. If not, the user is notified by a beep/bell and a brief ERROR message. The user can type the (PF2) key to get a more detailed description of the error, or type ***<CR>*** to return to the previous menuline.

Table 3
Frequently Used Control Keys

An explanation of some of the more frequently used control keys is given below.

CTRL/H	Move the cursor one space to the left, i.e., backspace. CTRL/H is typed by pressing the CONTROL or CTRL key and the H key.
CTRL/J	Move the cursor down a line.
CTRL/K	Move the cursor up a line.
CTRL/L	Move the cursor one space to the right.
TAB	Move the cursor to the next field. TAB is the preferred keystroke for moving through a screen form. The RETURN key and CTRL/N keystrokes can also be used to perform this function.
CTRL/P	Move the cursor to a previous field.
RETURN	Move the cursor to the next field, blanking out everything to the right of the cursor. This is useful when the user wants to replace a value that is shorter than the previous.
DELETE	Erase the character to the left of the cursor. This key is called RUBOUT on some terminals.
ESC	This is the menu key on some terminals. On a VT100, the menu key is PF1. It drops the cursor down to the menu line.

For additional information relative to control key functions, the user should select the ***KEYBOARD*** help option, followed by the ***CTRLKEYS*** option.

2.5.3 Screen Form Data Entry

In general users are prompted on the bottom line of the screen to enter query input and upon hitting return, a database query is generated and invoked. Sometimes, screen form input is required to query the datbase. In such cases, the user must enter information right on the screen form. For example, the MIPS username and password screen on initial login is an example of entering information into a screen form.

A wild card is a special character, usually an asterisk (*), which can be substituted for other individual characters and/or character strings. For MIPS, the wild card character can be entered after any alphanumeric information. If the user were interested in examining all CRAB NEBULA proposals, he could enter ***CRAB** after the prompt for a title and then select the appropriate menu item. This would retrieve all proposals that had the word 'CRAB' in the title.

The user should note that screen forms are case sensitive. Every attempt has been made to avoid this problem by entering data in upper case at all times and by forcing the appropriate case within the MIPS source code. For example, all user and investigator names in the database are entered in

upper case, but proposal titles were entered in upper and lower case. A query on proposal title may get different results depending on whether the user types **NEBULA**, **nebula**, or **Nebula** on the screen form.

2.5.4 EDT Editor

Several menu items will make use of the EDT editor. This section will provide help in the use of this facility. When the user first enters the EDT editor, the screen is blank except for an end-of-buffer marker **[EOB]**. The user is now in insert mode and can type in his text message. The RETURN (<CR>) key is used to end a line and return the cursor to the next line. The **[EOB]** marker will move down as text is inserted. The EDT editor initially has the no automatic wrapping set, therefore, text moves off the screen if RETURN is not pressed at the end of every line. This "invisible" text is flagged by a solid diamond at the right margin and can be displayed by typing ***RETURN*** (<CR>) while the cursor is either in front of or on the diamond. The previously "invisible" text will now appear on the next line. To set the editor to automatically wrap text to the next line at the right margin, type ***SET WRAP*** at the * prompt given when ***CONTROL/ Z*** is executed. The BACKSPACE key moves the cursor to the left and deletes text. The ARROW keys can be used to move the cursor around the screen without deleting text.

To end a session and save a file for sending, the user should enter ***CONTROL/Z***. At the * prompt, the user should then type ***EXIT*** and press ***RETURN***. To return from the * prompt to the file for further editing, the user can type ***C <CR>***. To end a session without saving the file for sending, the user should again type ***CONTROL/Z*** followed by ***QUIT <CR>*** at the * prompt.

To receive HELP while editing a file, the user should once again type ***CONTROL/Z***. At the * prompt, the user should enter ***HELP <CR>***. If the user has a keypad, pressing ***PF2*** will display a diagram and explanation of the keypad. The keypad offers many features for scrolling pages, searching for keywords, and deleting and inserting text.

3. USING THE HELP SUBSYSTEM

The MIPS HELP menu item functions as an online tutorial as well as an 'assistance' resource. In the ROSAT MIPS, the first menu item will always provide HELP, i.e., instructions to users. The HELP menu, shown in Figure 4 below, lists each HELP section in step order. By completing Steps 1 through 7, the user will have an overall picture of the entire MIPS system. Under each section additional menu items are provided to assist users more specifically. Each section of HELP is equivalent to the HELP available in that part of the MIPS. For example, when a user selects Step 5, the Bulletin Board section, he will see the same information that he sees when selecting HELP directly from the Bulletin Board. The HELP menus must be exited by selecting the END menu item.

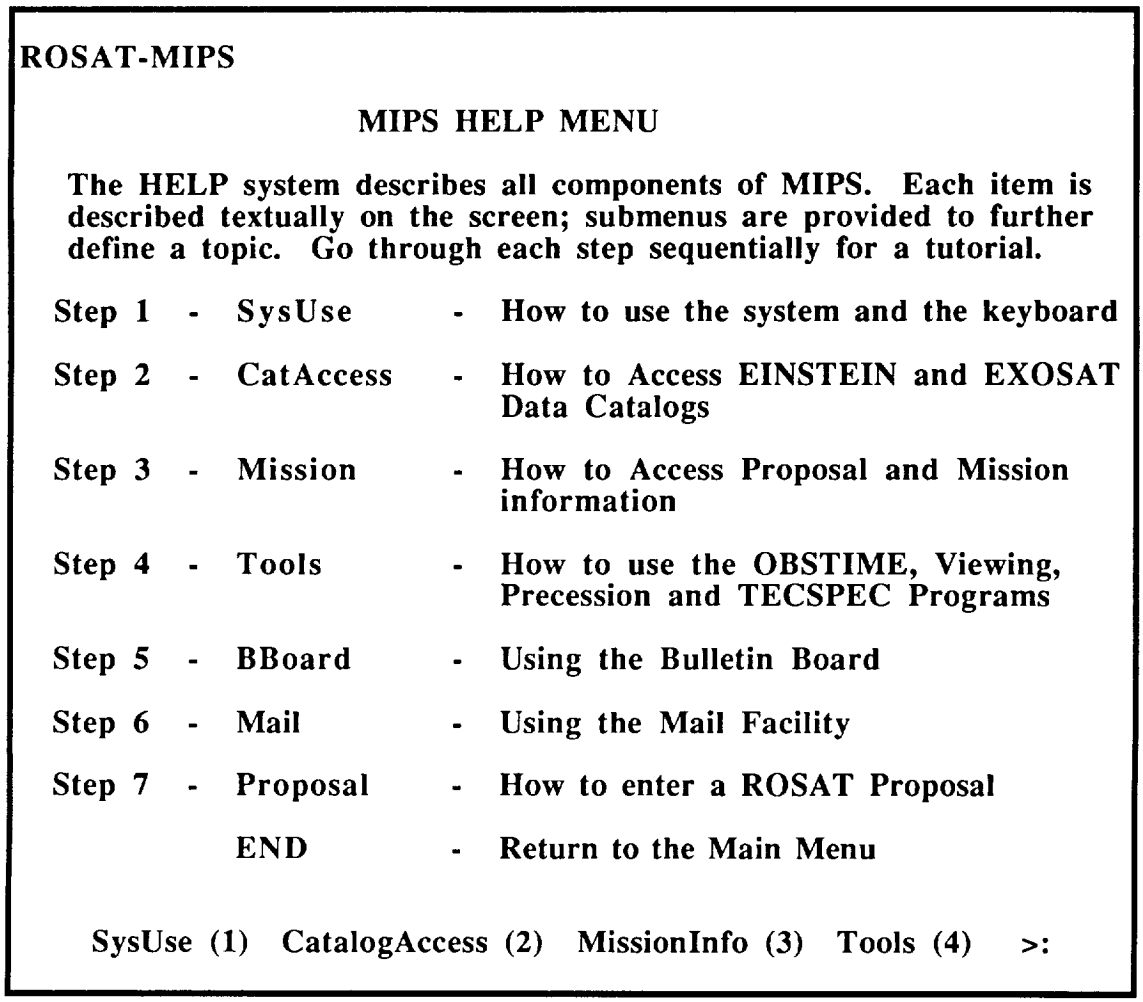

Figure 4. MIPS HELP Main Menu

4. CATALOG ACCESS INFORMATION

The Catalog Access subsystem provides users with information from the EINSTEIN IPC Source, EINSTEIN IPC Field, EINSTEIN, and EXOSAT observation catalogs. For all catalogs the user can perform a cone search around a central target. For the EINSTEIN and EXOSAT catalogs, the user may also search on other fields such as sequence number or title.

CATALOG ACCESS MENU

HELP	-	**HELP with different types of catalogs**
IPC Source	-	**Search the EINSTEIN IPC Source catalog**
IPC Field	-	**Search the EINSTEIN IPC Field catalog**
EINSTEIN	-	**Search the EINSTEIN Observation catalog**
EXOSAT	-	**Search the EXOSAT Observation catalog**
END	-	**Return to Access Menu**

HELP (PF2) IPCSource (2) IPCField (3) EINSTEIN (4) EXOSAT (5) >:

Figure 5. CATALOG ACCESS Main Menu

For the IPC Source and IPC Field menu items, the user is first prompted whether or not to use 1950 coordinates. The default is Epoch 2000 once the user enters Y or N another menu line is displayed.

4.1 EINSTEIN IPC SOURCE CATALOG

The CONESEARCH menu item is provided to allow the user to search the IPC SOURCE Catalog. After selecting CONESEARCH the user is prompted to enter the right ascension in hours (HH), minutes (MM), and seconds (SS) separated by commas. If a user types a ***<CR>*** following the prompt for right ascension, a default value is entered. It is not necessary to use a zero (0) place holder in right ascensions containing single digits, i.e., either "09" or "9" is acceptable. For right ascensions having a seconds (SS) value of zero, it is not necessary to indicate this in the entry, i.e., an RA of 12 hours 43 minutes and 0 seconds could be entered either "12,43,0" or "12,43". However, if either hours or minutes have a zero value, a "0" must be entered in the respective place, i.e., an RA of 43 minutes exactly must be entered either "0,43,0" or "0,43". Declinations should be entered following the same rules as right ascensions. A negative sign (keyboard hyphen) must be included only in the degrees (DD) segment of the declination, i.e., enter "-12,34,5" instead of "-12,-34,-5". A negative declination including only minutes and seconds

could be entered as either "-0,34,5" or "0,-34,5". During a cone search, users are prompted to enter a radius in arcminutes after entering values for both right ascension and declination. The radius field has a default of 30 arcmin.

The first time the user executes a cone search within Catalog Access, the defaults are set to zero for both RA and DEC. If the user enters values for the RA and DEC, then these are saved as the default. If the user wishes to perform several cone searches using the same RA and DEC, he only needs to enter the values once. The user may change the RA and DEC at any time by entering new values at the prompts. These values are not saved once the user exits out of the Catalog Access Submenu.

4.1.1 IPC SOURCE Catalog Data Fields

Once the search is completed a table of the results is displayed. The user may then choose the DISPLAYSOURCE menu item to display a table of the IPC SOURCES as there can be several sources associated with a particular field. He may also choose the DISPLAYFIELD menu item to display the entries one at a time in the full display format.

The information available in MIPS for HEAO-2 includes sequences from the IPC SOURCE catalog corresponding to the entries in the EINSTEIN IPC SOURCE catalog. The specific data is as follows:

SEQ#:	Sequence number shows the order in which observations were entered into the catalog.
F#:	Field number is assigned to all sources fulfilling detection criteria . It is an integer from 1 to N, N being the total number of detected sources for that observation.
*Global#:	Catalog global number.
RA and DEC:	are Epoch 1950 and/or Epoch 2000 and in HMS, DMS. This is the center of the field and, in most cases, the location of the object of prime interest.
+-:	Position and error assigned to the source position (RA and DEC). This error gives the radius of the 90% confidence circle for the source location.
Cor C/S:	Corrected count rate is a measure of the relative intensity of an X-ray source.
Error:	Corrected cell error is the uncertainty for the count rate.
*Net Cell Counts:	Net counts in the broad energy range (0.2-3.5 keV).
*Cell Bk:	Background cell counts.
S/N:	Signal to noise ratio of the source detection.
Sizcor:	Size correction for extended sources.
*ArcMin Off Axis:	Number of arcmin off the axis.

*Source Flag: The source flag is one or more letters which indicates that more information is available about particular conditions of this observation.

*Reference: The reference indicator serves to alert the user to bibliographic information which is given in the appendix. The meanings of the character strings are:

AGN: Active Galactic Nucleus
BL: BL Lac Object
CL: Cluster (or group) of galaxies
CV: Cataclysmic Variable
G: Galaxy
GC: Galactic Center
GCL: Globular Cluster
P: Pulsar
Q: Quasar
RS: Radio Source
S: Star
SNR: Supernova Remnant
SY: Seyfert Galaxy

*Detect Method: Method for source detection, either local or map.

RECO: Rib and edge code is a numeric flag with non-zero values indicating that the detection cell falls near or on a rab shadow or detector edge.

* Indicates the fields that are displayed when a DISPLAYSOURCE menu option is selected.

4.2 EINSTEIN IPC FIELD CATALOG

The CONESEARCH menu item is provided to allow the user to search the IPC FIELD Catalog. After selecting CONESEARCH the user is prompted to enter the right ascension in hours (HH), minutes (MM), and seconds (SS) separated by commas. If a user types a ***<CR>*** following the prompt for right ascension, a default value is entered. It is not necessary to use a zero (0) place holder in right ascensions containing single digits, i.e., either "09" or "9" is acceptable. For right ascensions having a seconds (SS) value of zero, it is not necessary to indicate this in the entry, i.e., an RA of 12 hours 43 minutes and 0 seconds could be entered either "12,43,0" or "12,43". However, if either hours or minutes have a zero value, a "0" must be entered in the respective place, i.e., an RA of 43 minutes exactly must be entered either "0,43,0" or "0,43". Declinations should be entered following the same rules as right ascensions. A negative sign (keyboard hyphen) must be included only in the degrees (DD) segment of the declination, i.e., enter "-12,34,5" instead of "-12,-34,-5". A negative declination including only minutes and seconds could be entered as either "-0,34,5" or "0,-34,5". During a cone search, users are prompted to enter a radius in arcminutes after entering values for both right ascension and declination. The radius field has a default of 30 arcmin.

The first time the user executes a cone search within Catalog Access, the defaults are set to zero for both RA and DEC. If the user enters values for the RA and DEC, then these are saved as the default. If the user wishes to perform several cone searches using the same RA and DEC, he only needs to enter the values once. The user may change the RA and DEC at any time by entering new values at the prompts. These values are not saved once the user exits out of the Catalog Access Submenu.

4.2.1 IPC FIELD Catalog Data Fields

Once the search is completed a table of the results is displayed. The user may then choose the DISPLAYFIELD menu item to display the entries one at a time in the full display format. He may also choose the DISPLAYSOURCES menu item to display a table of the IPC SOURCES as there can be several sources associated with a particular field.

The information available in MIPS for HEAO-2 includes sequences from the IPC FIELD catalog corresponding to the entries in the EINSTEIN IPC FIELD catalog. The specific data is as follows:

SEQ#:	Sequence number shows the order in which observations were entered into the catalog.
*Instrument:	Instrument used for this observation. For the IPC FIELD catalog this value is always i for IPC.
*Title:	Title of this observation.
RA and DEC:	are Epoch 1950 and/or Epoch 2000 and in HMS, DMS. This is the center of the field and, in most cases, the location of the object of prime interest.
Long:	Galactic Longitude measured in radians.
Lat:	Galactic Latitude measured in radians.
NH:	Column density of neutral hydrogen in atoms/cm** integrated along the line of sight through our galaxy in the direction of the target of observation.
*Roll Angle:	Angle which measures the roll of the spacecraft about the axis pointing towards the field center.
Livtm:	Livetime is the measure of the effective exposure time for the field center.
*BE Map Counts:	Bright Earth background map counts.
*DS Map Counts:	Deep Survey background map counts.
Start D:	Start date of the observation.
Stop D:	End date of the observation.
*Reference ID:	The reference indicator serves to alert the user to bibliographic information which is given in the appendix. The meanings of the character strings are: AGN: Active Galactic Nucleus BL: BL Lac Object CL: Cluster (or group) of galaxies CV: Cataclysmic Variable G: Galaxy GC: Galactic Center GCL: Globular Cluster P: Pulsar Q: Quasar RS: Radio Source

S: Star
SNR: Supernova Remnant
SY: Seyfert Galaxy

*Field Flag: The field flag is one or more letters which indicates that more information is available about particular conditions of this observation.

* Indicates the fields that are displayed when a DISPLAYFIELD menu option is selected.

4.3 EINSTEIN CATALOG SCREEN FORM

Three menu items specifically for the EINSTEIN data are provided to users under MIPS. These include CONESEARCH, SPECIFICSEARCH, and CATEGORY. The SEARCHes allow a user to view results of an EINSTEIN Catalog query in tabular form and full display form. These options also allow the user to save the results of his query to a file for later perusal. CATEGORY allows the user to view the various categories to which EINSTEIN observations were assigned. The user can also search for specific categories by the category number or name. Using this screen, users can formulate queries for retrieving EINSTEIN information. The fields represented on the screen are all available from the database.

4.3.1 SEARCHing the EINSTEIN Catalog

The user has two options for searching the EINSTEIN Catalog: SPECIFICSEARCH and CONESEARCH. If the user wants to formulate a query using only the fields on the form, he should select the SPECIFICSEARCH menu item. For example, the user might be searching for a particular target at sequence number 4441. The user would enter ***4441*** in the Sequence number field and then select ***SPECIFICSEARCH***. Users can enter as many fields as desired. The Observation Date allows users to perform range searches. A range search is a query that expresses a minimum or maximum value, or both. The EINSTEIN catalog stored dates in a date format of DD-MMM-YY. For example, a user might be interested in all observations taken between 01-Jan-1984 to 20-Jan-1984. On the screen, the user would enter ***01-Jan-84*** in the first date field, type a ***Y*** in the associated Range? field, and then ***20-Jan-84*** in the second date field. The user would then select the ***SPECIFICSEARCH*** menu item. If the user wishes to select all observations taken after the 15-May-1984 he would enter ***15-May-1984*** in the first date field and a ***Y*** in the associated Range? field. The user is prompted to enter > or < in accordance with his desire for the date to be a minimum or maximum value in the query. Once again, he selects ***SPECIFICSEARCH*** to start the query. This ranging technique is the same in other sections of MIPS. Range queries can be used in conjunction with single field queries. If the Range? is not marked Y, the query will be a straight equality.

The CONESEARCH menu item allows the user to search a given radius around a central source target. For example, if the user would like to see all catalog entries within 30 arcsec of the Crab Nebula, he would select ***CONESEARCH***. After selecting CONESEARCH the user is prompted to enter the right ascension in hours (HH), minutes (MM), and seconds (SS) separated by commas. If a user types a <CR> following the prompt for right ascension, a default value is entered. It is not necessary to use a zero (0) place holder in right ascensions containing single digits, i.e., either "09" or "9" is acceptable. For right ascensions having a seconds (SS) value of zero, it is not necessary to indicate this in the entry, i.e., an RA of 12 hours 43 minutes and 0 seconds could be entered either "12,43,0" or "12,43". However, if either hours or minutes have a zero value, a "0" must be entered in the respective place, i.e., an RA of 43 minutes exactly must be entered either "0,43,0" or "0,43". Declinations should be entered following the same rules as right ascensions. A negative sign (keyboard hyphen) must be included only in the degrees (DD) segment of the declination, i.e., enter "-12,34,5" instead of "-12,-34,-5". A negative declination

including only minutes and seconds could be entered as either "-0,34,5" or "0, -34,5". During a cone search, users are prompted to enter a radius in arcminutes after entering values for both right ascension and declination. The radius field has a default of 30 arcmin.

The first time the user executes a cone search within Catalog Access, the defaults are set to zero for both RA and DEC. If the user enters values for the RA and DEC, then these are saved as the default. If the user wishes to perform several cone searches using the same RA and DEC, he only needs to enter the values once. The user may change the RA and DEC at any time by entering new values at the prompts. These values are not saved once the user exits out of the Catalog Access Submenu.

A few pointers on querying the database:

- The user can query on as many fields as desired; however, the user should try to formulate sensible queries.
- The date must be entered at present in standard notation, i.e. 15-may-1984 format DD-MMM-YY.
- Character fields, particularly the Title field can be queried with the * wildcard character. For example, the user might be interested in all observations of the M31. In the Title field, he would enter ***M31*** to retrieve all observations where the title had a combination of M31 in it. This is one way around inherent naming inconsistencies. The user should note that characters may be entered in upper or lower case. Character fields include Title, Instrument, and Category.

4.3.2 Categories of the EINSTEIN Catalog

This menu item allows users to review EINSTEIN sequences that are assigned to a particular category. The CATEGORY TYPES menu item presents the user with a new screen which lists the category number and associated name. The CATEGORY screen allows the user to enter one of two fields, either the category number or the category name. When entering the category number, the user must include the periods, for example: 1.2.0 or 4.0. When entering the category name, the user is permitted to use the wildcard character *. The name must be entered in upper and lower case, since INGRES is case sensitive. After entering either the category number or the category name, the user selects the ***SEARCH*** menu item to query the database. The records retrieved are placed in the table in the lower portion of the screen. The user scrolls from record to record by using the UP and DOWN ARROW keys. The TAB key is used to scroll through the fields allowing the user to view the "wrapped" results. By using the TAB key the user is eventually returned to the category number and name fields where he can execute another query.

4.3.3 EINSTEIN Catalog Data Fields

The information available in MIPS for HEAO-2 includes sequences from the EINSTEIN catalog corresponding to the entries in the EINSTEIN Yellow Book catalog. The specific data is as follows:

SEQ#: Sequence number shows the order in which observations were entered into the catalog.

RA and DEC: are Epoch 1950 and in HMS, DMS. This is the center of the field and, in most cases, the location of the object of prime interest.

INST:	Instruments - IPC - imaging proportional counter HRI - high resolution imager SSS - solid state spectrometer FPC - focal plane crystal spectrometer G10 - objective grating spectrometer, 1000 line/mm grating G05 - objective grating spectrometer, 500 line/mm grating
OBSVR:	For Guest Observers, it is the number assigned by NASA to the original proposal.
OBSDATE:	Observation Date refers to the start time of stable pointing. (DD/MM/YY)
TIME:	TIPI is the time in the processed image in kilosecs. Served as a lower bound for acceptance, default value is 0.
*CATEGORY NO:	is a number of the format (C.C.C.) The field corresponds to the categories listed in the Table of Contents of the Einstein "Yellow Book".
*CATEGORY:	is the corresponding textual information for the category number.
TITLE:	is descriptive text comment.

*Indicates the fields that are displayed when a DISPLAY... menu option is selected.

4.4 EXOSAT CATALOG SCREEN FORM

Three menu options for viewing EXOSAT data are provided to users in MIPS. These include the CONESEARCH, SPECIFICSEARCH, and DEFINITION menu items. The SEARCHes allow a user to view results of an EXOSAT Catalog query in tabular form and one at a time. These options also allow the user to save the results of his query to a file for later perusal. DEFINITION allows users to review the definitions of the following fields: IOFDefin (instrument On/Off), FGDefin (filter/grating), PropClass (proposal class).

4.4.1 Searching the EXOSAT Catalog

The user has two options for searhing the EXOSAT Catalog: CONESEARCH and SPECIFICSEARCH. The CONESEARCH menu item allows the user to search a given radius around a central source target. For example, if the user would like to see all catalog entries within 30 arcsec of the Crab Nebula, he would select ***CONESEARCH***. After selecting CONESEARCH the user is prompted to enter the right ascension in hours (HH), minutes (MM), and seconds (SS) separated by commas. If a user types a <CR> following the prompt for right ascension, a default value is entered. It is not necessary to use a zero (0) place holder in right ascensions containing single digits, i.e., either "09" or "9" is acceptable. For right ascensions having a seconds (SS) value of zero, it is not necessary to indicate this in the entry, i.e., an RA of 12 hours 43 minutes and 0 seconds could be entered either "12,43,0" or "12,43". However, if either hours or minutes have a zero value, a "0" must be entered in the respective place, i.e., an RA of 43 minutes exactly must be entered either "0,43,0" or "0,43". Declinations should be entered following the same rules as right ascensions. A negative sign (keyboard hyphen) must be included only in the degrees (DD) segment of the declination, i.e., enter "-12,34,5" instead of "-12,-34,-5". A negative declination including only minutes and seconds could be entered as either "-0,34,5" or

"0, -34,5". During a cone search, users are prompted to enter a radius in arcminutes after entering values for both right ascension and declination. The radius field has a default of 30 arcmin.

The first time the user executes a cone search within Catalog Access, the defaults are set to zero for both RA and DEC. If the user enters values for the RA and DEC, then these are saved as the default. If the user wishes to perform several cone searches using the same RA and DEC, he only needs to enter the values once. The user may change the RA and DEC at any time by entering new values at the prompts. These values are not saved once the user exits out of the Catalog Access Submenu.

If the user wants to formulate a query using only the fields on the form, he should select ***SPECIFICSEARCH*** menu item. The fields represented on the screen are all available from the database. The user can press the TAB key to travel from field to field in the forward direction and CTRL/P to travel backward. For example, the user might be searching for all targets belonging to PI number 5. The user would enter a ***5*** in the PI number field and then select ***SPECIFIC-SEARCH***. Users can enter as many fields as desired.

Users are allowed to perform range searches on the Observation Date field. A range search is a query that expresses a minimum and/or maximum value. The EXOSAT catalog stored dates in a modified date format: YYDDD. Users may query the catalog using the modified date or can use a standard date notation, such as '10-Jun-1984'. The different date fields, standard and modified are marked on the screen form. For example, a user might be interested in all observations taken between 01-Jan-1984 to 20-Jan-1984. On the screen, the user would enter ***01-Jan-84*** in the first date field, type a ***Y*** in the associated Range field, and then ***20-Jan-84*** in the second date field. The user would then select the ***SPECIFICSEARCH*** menu option. If the user wishes to select all observations taken after the 15-May-1984 he would enter ***15-May-1984*** in the first date field and a ***Y*** in the associated Range? field. The user is prompted to enter > or < in accordance with his desire for the date to be a minimum or maximum value in the query. Once again, he selects ***SPECIFICSEARCH*** to start the query. This ranging technique is the same in other sections of MIPS. Range queries can be used in conjunction with single field queries. If the Range? is not marked Y, the query will be a straight equality.

A few pointers on querying the database:

- The user can query on as many fields as desired; however, the user should try to formulate sensible queries.
- The date may be entered at present in standard notation, ie. 15-may-1984 or in modified date format YYDDD.
- Character fields, particularly Target Name, can be entered with the * wildcard character. For example, the user might be interested in all observations of the M31. In the Target Name field, he would enter *M31* to retrieve all observations where the target name had a combination of M31 in it. This is one way around inherent naming inconsistencies. The user should note that characters may be entered in upper or lower case. Character fields include Target Name, Proposal Class, and Proposal Code.

4.4.2 EXOSAT Catalog Data Fields

The following is specific information on the data available in MIPS for EXOSAT:

RA and DEC: RA and DEC are in 1950 epoch; note that these are not the target coordinates. They are for the star tracker. Normally, the target is offset from star tracker by about 2 arc minutes.

OBS DATE: The start date of a stable pointing period.

OBS TIME: The length of stable pointing in kilosec.

PRC: Proposal class is a three letter code:

AGN	Active Galactic Nuclei
EXG	Other kinds of Galaxies
CLU	Clusters of Galaxies
HLX	High-Luminosity Galactic Sources
LLX	Low-Luminosity Galactic Sources
SNR	Supernova Remnants
OPS	Operational Activities
CAL	Calibration
DEE	Deep Field
MIS	Miscellaneous
PV	Performance Verification
TOO	Target of Opportunity
OCC	Occultation Observation
IFT	

PRCODE: The Proposal Identifier 5 character string, no special format.

Target Name: This is the name assigned to a given target. There is no special target convention for synonyms or precise name format, so an editor search for a particular name will not be reliable.

PI#: The number of the Principal Investigator

IOF: This code indicates if any instrument was off. IOFCOD is the sum of:

	ON	OFF
LE1	0	1
ME	0	2
GS	0	4

FG: This is the filter and grating code. If any filter or the CMA grating was used during the observation, then a bit is set. FGCOD is the sum of:

	USED	NOT USED
PPL	1	0
4000 LEXAN	2	0
ALP	4	0
3LX(3000 LEXAN)	8	0
BO(Boron)	16	0
Grating	32	0

5. ACCESSING MISSION INFORMATION

The Mission Information subsystem provides user with information relative to the ROSAT mission and its detailed X-ray sources. This includes data on Proposals, Targets, Investigators, and the Mission Timeline. In general, menu items usually prompt for input from the user and then present the results in a screen form. The mission timeline menu item presents the user a submenu.

ROSAT MISSION INFORMATION MENU

HELP	-	**HELP with screen forms**
ProposalInfo	-	**Query ROSAT Proposal Information**
InvestInfo	-	**Query ROSAT Investigator Data**
MissionTimeLine	-	**Retrieve schedule, etc... for ROSAT Mission Timeline**
NameSearch	-	**Search for ROSAT target by name**
ConeSearch	-	**Search for ROSAT target by RA, DEC radius**
DisplayPage	-	**Display all information on ROSAT target**
WFCInfo	-	**Display information on corresponding WFC investigators**

Help (PF2) ProposalInfo (2) InvestInfo (3) MissionTmLine (4) >:

Figure 6. ROSAT MISSION INFORMATION Main Menu

5.1 PROPOSAL INFORMATION

This section allows the user to query the database for ROSAT approved proposals by a proposal number or by proposal title. The user is prompted initially for a proposal number. The user should enter the proposal number or can hit return. By hitting return, the user will be prompted for a piece of the title of a proposal. The user can enter the complete title of a proposal or as much as the user desires in a pattern search. All searches are performed with a wild card character, an asterisk (*), appended to the end of the query. A wild card is a special character, which can be substituted for other individual characters and/or character strings. For MIPS, the wild card character can be entered before any alphanumeric information. If the user were interested in examining all CRAB NEBULA proposals, he could enter ***CRAB*** after the prompt for a title and then select the appropriate menu item. This would retrieve all proposals that had the word 'CRAB' in the title.

The user should note that screen forms are case sensitive. Every attempt has been made to avoid this problem by entering data in upper case at all times and by forcing the appropriate case within the MIPS source code. For example, all user and investigator names in the database are entered in upper case, but proposal titles were entered in upper and lower case. A query on proposal title may get different results depending on whether the user types **NEBULA**, **nebula**, or **Nebula** on the screen form.

5.2 INVESTIGATOR INFORMATION

The ROSAT Investigator screen form provides users information on approved investigators and their proposals. The data available comprises the proposals that were approved after the International ROSAT Peer Review. Since ROSAT pointed sessions are organized in six month intervals, the phase that the proposal is assigned to is displayed in the upper corner of the screen form. This screen form provides users with information on the approved proposals an investigator has submitted as well as their institution and address.

Initially the user is prompted to enter the investigator's last name. Users can enter the name in upper or lowercase and need only to enter as much as is familiar. For example, the user need only type ***SMI*** for the last name ***SMITH***. The user is then prompted to enter the Investigators first name or initial (the user can bypass entering the investigators first name or initial by hitting the ***<CR>***). If the last name is not found in the database, the user is notified. Likewise, if there is more than one **SMITH** in the database, the user is requested to enter more information at the prompt such as first name. Once the investigators address information is displayed the user has the option of selecting the **PROPOSAL** menu item. **PROPOSAL** will display a second screen form and provide the user access to information on each approved proposal submitted by the investigator. The user can scan all of the investigators proposals by selecting the **NextProposal** menu item. In addition to displaying each proposals Title, Number of Targets, and Subject the user can select the **ABSTRACT** menu item to display the proposals abstract.

5.3 MISSION TIMELINE

Under the Mission Timeline menu option, users can examine selected target information on a particular proposal, all targets viewed on a given date, or all targets for a particular investigator from actual mission timelines. Mission timelines are the 6 month lists of pointed ROSAT target observations. An approved proposal will request to have a target observed for a specified number of seconds. The mission timeline is the schedule that states when that target will be observed and the duration of the observation. The target should be observed a sufficient number of times to equal the approved proposal time. To review the information in the mission timeline, the user can access the data by checking for a specific proposal number in the timeline, by checking for observations to be made on a specific date and finally by an investigator's last name.

The initial menu states which mission timelines are available from MPE. At this time only the PCV phase data is in the database covering the July 16-July 31, 1990 period.

In order to display the available Mission Timeline information the user must select one of the following search menu items:

> **PropSearch** - The user can examine when observations will be taken by ROSAT for a specific proposal number.

DateSearch - The user can specify a given date in the mission timeline and the screen form will display observations to be made on that date.

InvestSearch - The user can enter a PI's last name and the screen form will display the observations that will be made in response to his proposal(s).

We expect the first pointed session mission timeline to be available in MIPS in January 1991.

5.3.1 Mission Timeline Screen Form

The Mission Timeline screen form contains the following target information: Proposal Number, Target Number, ROSAT Observation Request Number, Start Date (date the observation starts), Start Time (time the observation starts), Duration/Seconds (the duration of the observation in seconds), Instrument used, Target Priority number, and the Country (the country [CA-calibration, US-United States, WG-West Germany] that owns the data).

The following menu items are available on the Mission Timeline screen form:

DisplayPage - The user can display specific target information for each target. This information includes the target name, position in 1950 and J2000, instrument, filter options, etc... The user should position the cursor to sit on the record number of the target to be displayed. To move through the table from target number to target number, the user should use the UP and DOWN ARROW keys.

Screen - Prints the information on current screen into a file. This will print the data currently displayed plus the textual data on the screen.

In addition to the above, the standard menu items have been implemented; these items include **Help, PrevPage, NextPage, Top, Bottom, END, MAIN** and **QUIT**.

5.4 SEARCHING FOR TARGETS BY NAME

NameSearch allows user to search for a ROSAT target by name. The user is prompted for a target name, which can be entered in upper or lowercase. The program will automatically search the database for targets that match the name entered by the user. ROSAT proposals allowed users to enter a target name and an alternate target name, the database searches both fields. If the user is interested in retrieving all data for a particular target that might have been entered in different patterns, the user should enter a wildcard character '*' followed by a unique minimum set of characters. For example, ***ORI*** will pick up the following targets: BETA ORI, DELTA ORI, ORI#16, ORI#14. It is not necessary to place a wildcard at the end of the character set. A search on ***ORI*** and a search on ***ORI**** will both pick up ORI#16 and ORI#14.

After the Target Name is successfully entered the ROSAT Target Information screen form is displayed. This screen form contains the following target information: Proposal Number, Priority number, Target Number, Target Name, Right Ascension, Declination, Observation Time, number of Observations, whether the observation is Time Critical, and Detector used (H=HRI, P=PSPC).

The following menu items are available on the NameSearch screen form:

DisplayPage - The user can display specific target information for each target. This information includes the target name, position in 1950 and J2000, instrument, filter options, etc... The user should position the cursor to sit on the record number of the target to be displayed. To move through the table from target number to target number, the user should use the UP and DOWN ARROW keys.

Screen - Prints the information on current screen into a file. This will print the data currently displayed plus the textual data on the screen.

In addition to the above, the standard menu items have been implemented; these items include **Help**, **PrevPage**, **NextPage**, **Top**, **Bottom**, **END**, **MAIN**, and **QUIT**.

5.5 SEARCHING FOR TARGETS IN A "CONE"

ConeSearch allows users to search for a ROSAT target by Right Ascension and/or Declination within a "cone" of a given radius. The results of this search will be a list of targets that overlap the target range. Spherical geometry is used to test whether the target is within the specified range.

After selecting the ConeSearch menu item the user is asked whether or not to use the 1950 coordinates (*Y* or *N*). Next the user is prompted to enter the following:

Right Ascension (HH, MM, SS.S)
Declination (+/-DEG, MM, SS.S)
Radius (in arcminutes)

The user can enter the default by hitting the ***<CR>***.

After the range is successfully entered the ROSAT Target Information screen screen form is displayed. This screen form contains the following target information: Proposal Number, Priority number, Target Number, Target Name, Right Ascension, Declination, Observation Time, number of Observations, whether the observation is Time Critical, and Detector used (H=HRI, P=PSPC).

The following menu items are available on the ConeSearch screen form:

DisplayPage - The user can display specific target information for each target. This information includes the target name, position in 1950 and J2000, instrument, filter options, etc... The user should position the cursor to sit on the record number of the target to be displayed. To move through the table from target number to target number, the user should use the UP and DOWN ARROW keys.

Screen - Prints the information on current screen into a file. This will print the data currently displayed plus the textual data on the screen.

In addition to the above, the standard menu items have been implemented; these items include **Help**, **PrevPage**, **NextPage**, **Top**, **Bottom**, **END**, **MAIN**, and **QUIT**.

5.6 ROSAT TARGET SCREEN FORM

The ROSAT Target screen form provides users with all data on the targets. The screen form includes the following target information:

Proposal Period: The phase to which the proposal is assigned.

Proposal Number:	Proposal number for this target.
Specific Target #:	Target number.
Priority:	Priority assigned to this target.
Source Name:	Used to identify the target.
Alternate Name:	Alternate target name.
Source Position:	The Right Ascension and Declination of the target (specified in equinox 2000).
Observation Time:	The total requested observing time for the specified pointing direction in kiloseconds.
Number of Observations:	How many ROR's will be generated from the target form.
Time Critical:	Whether special time constraints apply or not.
Wide Field Camera Zoom Flag On:	This field requests a small or large WFC field of view.
Instrument Configuration:	Either the PSPC or the HRI as the primary. The WFC should always be considered secondary. The primary instrument is denoted by the entry 1, the secondary instrument by the entry 2 and the instrument not to be used by the entry 0.
Remarks:	The remarks entry provides room for special remarks, note that it cannot be guaranteed that any requests in this field will be taken into account. This field is 200 characters in length.
PSPC Filter Sequence:	These fields specify the requested PSPC filter sequence when the PSPC is the primary or secondary instrument. The filter identifications are OPEN and BORON to indicate whether PSPC observations in the open position or with the boron filter. In case no filter change is requested, the OPEN filter identification with percentage time set to 100 percent and minimum time set to zero will be used.
WFC Filter Sequence:	These items specify the requested WFC filter sequence. U.S. observers may choose to suggest a WFC filter sequence, but it cannot be guaranteed that the specified sequence will be scheduled. The filter identification for the WFC is S1, S2, P1, P2 and OPQ to indicate filters of choice.

The following menu items are available on the Target screen form:

Help - Help with the screen form

NextTarget - Displays the next approved target for the proposal.

END - Return to the previous menu.

MAIN - Go to MIPS main menu.

QUIT - Quit out of MIPS entirely.

5.7 WFC INVESTIGATOR INFORMATION

This screen form shows the corresponding WFC Investigators for each approved ROSAT proposal. The table displays the proposal number, the name of the proposer and his/her institution. The information is listed in order of proposal number.

The standard menu items have been implemented in WFCInfo; these items include **Help**, **NextPage**, **PrevPage**, **Top**, **Bottom**, **END**, **MAIN**, and **QUIT**.

6. TOOLS FOR PROPOSAL PREPARATION

The TOOLS subsystem includes calculation programs and direct access to the database for information on the ROSAT hardware specifications and performance (both predicted and measured). These TOOLS are provided to assist users in proposal preparation. The ROSAT technical specifications are known as TECSPEC under the MIPS TOOLS selection. Four scientific application programs are available in MIPS at the present time: VIEWING, OBSTIME, PRECESS, and ECLTRANS. Also available are the PSPC survey exposure times in a specific screen form. These five options, along with TECSPEC, form the menu selections for the TOOLS subsystem as listed below (Figure 7 displays the TOOLS Main Menu):

VIEWING -- A program that will calculate parameters of the viewing window for a target.

OBSTIME -- A program that will calculate either exposure time or signal-to-noise ratio for a target based on user specified criteria.

TECSPEC -- Screen forms and reports that enable users to examine the ROSAT Technical Specifications. TECSPEC is organized as a multimenu system providing access to the hardware specifications and performance statistics.

PRECESS -- A program that will precess user specified coordinates to a user specified epoch. This program has been included due to the fact that users must enter their ROSAT proposal in EPOCH 2000 coordinates.

ECLTRANS -- A program that will transform user specified coordinates from Right Ascension and Declination to ecliptic coordinates and vice-versa.

PSPCEXPTIME -- Screen form that displays the PSPC survey exposure times at given ecliptic latitudes.

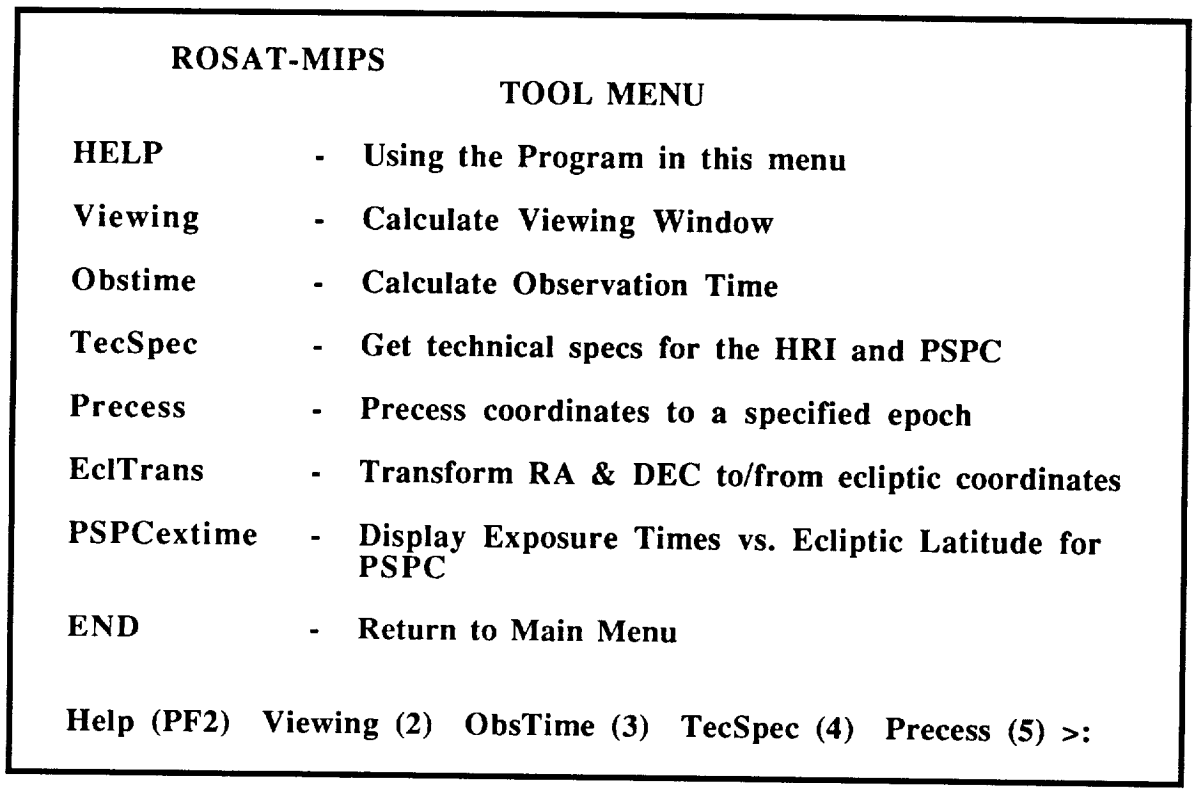

Figure 7. TOOLS Main Menu

6.1 USING THE VIEWING PROGRAM

The VIEWING program will assist mission planners and guest observers with questions pertaining to the ROSAT orbit, target availability, and coincidence with solar system objects. Guest observers will use VIEWING primarily to schedule time critical observations (i.e., simultaneous ground observations or observations at a particular phase of a variable source). The VIEWING program will calculate viewing windows for targets based on a given time period and target position. If specified the program will check for coincidence with solar system objects. This program also converts target position into ecliptic coordinates. More detailed information on VIEWING is provided in Appendix F.

The user is initially presented a blank screen with the cursor blinking in the **START DATE** box (shown in Figure 8). The user should enter a start date and use the TAB key to move to the next box to enter an end date. The date may be entered in one of two formats in the order month, day, and year (either in the format MM-DD-YY or MM/DD/YY). The user is notified of any error in date entry. The user should then tab to the target position area and enter the right ascension in the order: hours, minutes, and seconds. Any out-of-range values are flagged and the user is informed. After tabbing over to the declination field, the user should enter the degrees, minutes, and seconds. The user should then tab to the epoch of target field and optionally enter an epoch date. By default, 1950 is select as the target epoch date. The next field the user should tab to is the coincidence check field. If the user decides to check for solar system coincidences, a *Y* should be entered into the check field. This operation is time consuming and for large date ranges the program could take a few minutes. If the user is interested in the coincidence check, a radius for the coincidence circle should be entered in the next field. The radius constraint should be entered in degrees on the viewing window. The user has the option of whether or not to enter a target name or notation. This is useful in reviewing multiple viewing files later on. The user will be notified if any error has been made entering each input.

The following menu items are available to users:

> **DETAIL** -- Description of the VIEWING program software and algorithms (the user should consult Appendix F for more detailed information).
>
> **RUN** -- The user must enter at least the dates and target position variables into the screen form. Once the desired values have been entered into the fields, the user selects Run to run the variables through the VIEWING program. The results of the Run are placed into the RESULTS box on the lower portion of the screen form. The cursor appears in the RESULTS box, enabling the user to scroll through the lines of output using ARROW keys or the NextPage or PrevPage menu items. The user can print the screen of results with the PrintScreen menu item. The user can then tab up to the start date box to enter the next VIEWING window target.

As in OBSTIME, a file is created as an intermediate result of the run sequence. The file is created based on the data that the user has entered into the screen form and has the output derived by the VIEWING program appended to it. A file will exist for each time the VIEWING program is run, for example, VIEW1010.UPF, where 1010 is the unique user id. The user may review the file and mail it back to the user's home computer facility using MIPSMAIL. The input variables used by VIEWING are described in Table 4.

Start Date: 11-24-90
End Date: 11-24-91

ex: 11-3-90

Program: VIEWING
User Name: JBEHNKE
Run Date: 01-feb-1989

Target Position:

RA Hrs: 13
Min: 35
Sec: 23

DEC Deg: 3
Min: 43
Sec: 12

Epoc of Target: 1950.0
Do you want to check for coincidences? N [Y/N]
Radius of Coincidence Circle: 1.000 in degrees
Optional Target Name:

Use NextPage and PrevPage to scroll through ENTIRE table of results.

RESULTS (more...)

(This section is filled in with results after RUN is selected)

Help(PF2) Detail(2) Blank(3) Run(4) PrevPage(5) >

Figure 8. VIEWING Screen Form

Table 4
Input Variables for VIEWING

Variable	Format/ Default	Description
Start Date	1/1/89 1-1-89	Start date of the viewing period of interest
End Date	12/31/89 12-31-89	End date of the viewing period of interest
Target Position	HH MM SS	Right Ascension entered as integers in Hours, Minutes and Seconds
	DEG MM SS	Declination entered as integers in Degrees, Minute and Seconds
Epoch of Target	1950.5	Enter epoch of target based on the fraction of the year. Default is 1950.
Coincidence Check	Y or N	If user would like to check for coincidence of solar system objects with viewing windows. Default No Check.
Radius of Coincidence Circle	1.00	Radius of the Coincidence Circle entered in degrees. Default is 1.00.
Target Name	(optional)	A name (character string) to tag the results of the RUN. This variable is optional.

Results of a run are placed into the box on the lower portion of the screen. Often more results are available than what initially appear in the box. The user should select the NextPage menu item to continue through the rest of the results. There are three sections to the results; the position coordinates, the intervals for windows, and the coincidences with solar system objects. Figure 10 is an example of typical output of the VIEWING program appearing in the RESULTS box on the screen form. Complete explanations of each section of the results are labelled A, B, and C. Additional examples of the input and output of the program are shown in Figures 10, 11 and 12.

TARNAME: moon check

	RA	DEC	EPOCH		
A	6 10 36	29 30 0	1989.00		
	6 8 6	29 30 31	1950.00	91.77	6.08

B INTERVALS FOR WINDOWS

ENTER			EXIT		
Yr	Month	Day	Yr	Month	Day
89	Mar	6.84	89	Apr	6.26
89	Sept	8.97	89	Oct	9.75

C The coincidence data for : moon

89 Mar 13.96 89 Mar 14.07 (1.40) 89 Mar 14.19 moon

The coincidence data for: moon

89 Sept 21.29 89 Sept 21.33 (1.91) 89 Sept 21.37 moon

A TARNAME is the optional target name that was assigned at RUN time. RA, DEC and EPOCH are echoed to the screen in their original state and the results of their precession to the 1950 EPOCH are printed underneath. Beside these results are the RA and DEC for the target converted to ecliptic coordinates in degrees.

B INTERVALS FOR WINDOWS are given below the target position including the ENTRY Date and EXIT Date of the viewing window.

C COINCIDENCES are given under the window intervals. The object within the viewing window is given along with its occulting date. The first date is the time the occulting object enters the coincidence circle of the radius supplied by the user. The second date is the closest approach of the occulting object to the user's target. The number in parentheses indicates how close the occulting object is to the user's target on this date. The third date given is the date when the occulting object leaves the coincidence circle.

Figure 9. Reading the Results of the VIEWING Program

EXAMPLE 1: The user designates a target that is close to always being visible to ROSAT. For a time span of February 1989 thru December 1991, look around RA 6H, DEC -50D for epoch 1989. Also, check for coincidences with solar system objects around 1 degree. On the VIEWING screen form the boxes were filled is as follows:

```
start date:          2-1-89
end date:           12-30-91
ra:                 6 0 0          !ra in hr,min,sec
dec:                -50 0 0        !dec in deg,min,sec
epoch of target:    1989.00

Check for coincidences:          Y
Radius of Coincidence Circle:    1.000
Optional Target Name:            close to always visible
```

RESULTS

TARNAME: close to always visible

RA			DEC			EPOCH		
6	0	0	-50	0	0	1989.00		
5	59	2	-50	0	-1	1950.00	89.46	-73.45

INTERVALS FOR WINDOWS

ENTER			EXIT		
Yr	Month	Day	Yr	Month	Day
89	Feb	1.00	89	May	25.58
89	July	16.33	89	Nov	26.57
90	Jan	14.16	90	May	25.83
90	July	16.59	90	Nov	26.82
91	Jan	14.42	91	May	26.09
91	July	16.84	91	Nov	27.08

Checked for coincidences but none were found.

Figure 10. VIEWING PROGRAM (Example 1 of 3)

EXAMPLE 2: Check for coincidences of the moon with a given target.For the entire year 1989, check whether the moon will coincide within 1 degree of the target, (RA 6H 10' 36" and DEC 29D 30' 0"). In this instance none of the viewing windows showed coincidences with the moon. On the VIEWING screen form, the boxes were filled in as follows:

start date:	**1-1-89**	
end date:	**12-31-89**	
ra:	**6 10 36**	**!ra in hr,min,sec**
dec:	**29 30 0**	**!dec in deg,min,sec**
epoch of target:	**1989.00**	
Check for coincidences:	**Y**	
Radius of Coincidence Circle:	**1.000**	
Optional Target Name:	**moon check**	

RESULTS

TARNAME: moon check

RA	DEC	EPOCH		
6 10 36	29 30 0	1989.00		
6 8 6	29 30 31	1950.00	91.77	6.08

INTERVALS FOR WINDOWS

ENTER			EXIT		
Yr	Month	Day	Yr	Month	Day
89	Mar	6.84	89	Apr	6.26
89	Sept	8.97	89	Oct	9.75

Checked for coincidences but none were found.

Figure 11. VIEWING PROGRAM (Example 2 of 3)

EXAMPLE 3: Using the previous example, increase the coincidence circle to 2 degrees and check again. In this case, coincidences with the moon occurred during both viewing windows. On the VIEWING screen form the boxes were filled as follows:

```
start date:              1-1-89
end date:                12-31-89
ra:                      6 10 36      !ra in hr,min,sec
dec:                     29 30  0     !dec in deg,min,sec
epoch of target:         1989.00

Check for coincidences:              Y
Radius of Coincidence Circle:        2.000
Optional Target Name:                moon check
```

RESULTS

```
TARNAME:        moon check

          RA          DEC          EPOCH
      6  10  36    29  30   0      1989.00
      6   8   6    29  30  31      1950.00     91.77        6.08

INTERVALS FOR WINDOWS

        ENTER                        EXIT
Yr      Month     Day          Yr    Month     Day
89      Mar       6.84         89    Apr       6.26
89      Sept      8.97         89    Oct       9.75

The coincidence data for :      moon

89    Mar  13.96
89    Mar  14.07  (1.40)
89    Mar  14.19        moon

The coincidence data for :      moon

89    Sept  21.29
89    Sept  21.33  (1.91)
89    Sept  21.37        moon
```

Figure 12. VIEWING PROGRAM (Example 3 of 3)

6.2 USING THE OBSTIME PROGRAM

The Observing Time (OBSTIME) program is designed to help guest observers with their proposal preparation for ROSAT. The OBSTIME program allows the user to calculate either the amount of exposure time for an X-ray target given the signal-to-noise ratio or to determine the signal-to-noise ratio of the target given the exposure time. The user can choose various types of spectral models, various radii of integration, various energy band limits for the PSPC, and ways of specifying energy intensities and distances for the calculation of the exposure time or signal to noise ratio of the target. INGRES is used as the input and output interface to the menu-driven OBSTIME program. More detailed information can be obtained by selecting the TECHNICAL menu item under HELP, the contents of which are given in Appendix G.

6.2.1 Program Operation

The OBSTIME screen form, shown in Figure 13, contains the variables that are input to the OBSTIME program. The user is able to change variables, run the variables through the OBSTIME program and then review the output of the OBSTIME program. Additionally, each user is allowed to create and maintain nine input variable files in MIPS. Whenever the user accesses the OBSTIME screen form, a blank screen is presented for the user to either fill in or retrieve a stored parameter input file. The user is permitted to change values in a file, get different files, delete files, and save new files. The user runs the OBSTIME program against the values in the parameter file he is currently looking at. The OBSTIME results associated
with this particular parameter file will be displayed on the terminal screen.

There are 24 possible variables that the user can adjust to get the desired results from the OBSTIME program, thus giving the user great flexibility. However, the screen interface has been simplified such that the user is presented with as few as seven variables and a maximum of thirteen variables at any time. This depends upon the user's choice of focal plane detector and intensity specification. Default values are given so that the number of variables that the user MUST supply are minimal. Values for variables in the table in the bottom half of the screen form are entered as reals or strings. The value for a string variable such as FIL (PSPC boron filter) must be entered as Y or N, for example. All other variables must be entered as real values and MUST include the decimal point. Variables must be entered on the left of the screen, i.e., left justified. Pages 53 through 56 contain tables listing these variables. These tables can also be found in the technical help, which is accessed using the "Technical" menuitem of "Help".

The following ASCII parameter codes must be supplied at the top of the form in order to bring up the variables:

1. Output Desired - either signal-to-noise ration (SN) or exposure time (TIM).

2. Focal Plane Detector - either PSPC or HRI.

3. Spectral Model Code - there are three thermal spectral models (Black Body = BB, Exponential with a Gaunt correction = EG, and Raymond-Smith = RS), and a power law model where the user supplies the exponent of the power law (ALPHA).

4. Temperature Code - the thermal spectral models give the option of specifying the temperature in either kilo-electron volts (keV) or millions of degrees Kelvin (T).

5. Intensity/Flux Code - the intensity of the source through either broad band or monochromatic luminosity (LX or LM) or fluxes (FX or SX).

OBSTIME INPUTS FORM File No.: Filename:

Output Desired: SN (SN or TIM)
Spectral Model Code: BB (PL, EG, RS, BB)
Temperature Code: KT (KT or T)
Focal Plane Detector: PSPC (PSPC or HRI)
Intensity/Flux Code: LX (LX, LM, FX ,SX)
Distance Code: DZ (DZ, HQZ, DHQ)

user value	name	range	units
1.0E45	LX	0<LX<=60	ergs/s
0.2, 2.0	BIE	.02<=E1<E2<10.0	keV
*	*	*	*
*	*	*	*
*	*	*	*

Help(PF2) ?Descr(2) Run(3) GetF(4) SaveF(5) DelF(6) >:
ListF(7) Clear(8) Examine(9) End(PF3) Main(0) >:
Quit(PF4)

Figure 13. OBSTIME Screen Form

6. Distance Code - distance parameter variables are used to determine the distance to the source if the user elects to specify the intensity of the object as an intrinsic luminosity. The user may enter in the luminosity distance in parsecs(D), if known, along with a redshift (Z) (option DZ). If one of the luminosity distance or the redshift are not known, the user can enter which of the two he does know along with his or her favorite values for the Hubble parameter (H)and the deceleration parameter of the universe (Q) (options HQZ and DHQ).

Once these parameter codes have been entered into the blank fields at the top of the form, the variables that the user needs to supply information to will be displayed in the table.

Also, at the top of the screen form is a place for the current **File Number** and **File Name**. Until the user saves or gets a file from the database with **GETF** or **SAVEF**, the File Number and File Name fields will be blank. The parameter files that exist in the database can be displayed by selecting the **LISTF** menu item. When the user selects the **?DESCR** menu item a variable description is displayed between the blanks at the top of the form and the parameter table.

Movement on the screen is performed primarily with the use of the TAB key to go forward, CONTROL/P keys to go backward, and the ARROW keys. To move to each of the blanks on the top of the form and into and out of the table, the user should press the TAB key. The RETURN key will also move the cursor to the next field, but it will delete all characters to the right of the cursor. For example, this is useful in changing the Focal Plane Detector field from PSPC to HRI. To go from variable to variable in the **User Value** column of the table, the user should use the ***UP*** and ***DOWN ARROW*** keys or CONTROL/N. To change the values of the variables, the user can type completely over the value and use the ***RETURN*** key to clear the rest of the field or use the ***LEFT*** and ***RIGHT ARROW*** keys to type over significant digits. CONTROL/E toggles between insert and overstrike mode. As the user changes a variable, it is checked against the proper range for that variable. If there is an error, the user is informed and is not allowed to leave the variable until it is corrected. A list of ERROR messages from OBSTIME is provided in Appendix D of the MIPS Users Guide.

Output files are created after each successful run in the user's workspace. These can be electronically mailed or MIPS-MAILED to the user's site for printout. These files are named OBSTnnnnf.OUT, where nnnn (which can be 1 to 4 digits) is a unique identifier, and f with values from 1 to 9 corresponds to the parameter files saved by the user in the database. If the user is running an input entered from the screen form without saving it to the database or getting the parameter values from the database, the file number f will be 0 in the output file name. Example output files can be seen using the EXAMPLES menuitem within HELP, and in section 6.2.3. The output files contain the user's inputs with the output seen on the screen attached to the bottom. In addition to these files, for every output file there is a corresponding User Parameter File which has the same name as the output file, but with an extension of .UPF. These files are for debugging purposes. If the user has a problem running OBSTIME (e.g., the program crashes, gives wrong output), these files can be sent to the MIPS staff to be examined and run directly through the OBSTIME program. These files are the raw parameter input files into OBSTIME, and will be much less clear to the user than the output files which have been formatted for user-friendliness, unless the user is very familiar with OBSTIME.

Menu Items:

The following menu items are available to users and are accessed either by pressing the PF1 key (on VT100-200 series emulated terminals, ESC on others) and typing in the first unique characters of the menuitem name and RETURN, or by using the keypad key given in parentheses after the menuitem:

ROSAT MIPS OBSTIME: EXAMINE

ObsTime has been run on
the following input files:
0

INPUT:

EXPTIME = 2.000 ksec
BB: KT = 1.000 keV
LX = 0.100E+46
BIE = 0.20 2.00
NHS = 0.000E+00
NHG = 0.100E+20
D = 0.100E+01 parsec
Z = 0.000
PSPC_RAD = 30.0 arcsec FIL = N
BO = .05, 0.5 0.5, 1.0 1.0, 2.0
EXBG = 0.0

Enter the appropriate file number
and the run of the file to display:
What file to look at: 0
Which run to look at: 1
Number of times file 0
has been run: 1

OUTPUT:

BAND	0.05-0.50	0.50-1.00	1.00-2.00
Total cnts	0.614E+20	0.366E+21	0.822E+21
Backgrnd	1.60	0.730	0.322
Net cnts	0.614E+20	0.366E+21	0.822E+21
+/-	0.784E+10	0.191E+11	0.287E+11
Counts/sec	0.307E+17	0.183E+18	0.411E+18
SNR	0.784E+10	0.191E+11	0.287E+11

Help(PF2) Display(2) All(3) End(PF3)

Figure 13a. Results of EXAMINE

HELP --

WhatToDo	This document.
Technical	Provides technical details concerning each variable used by OBSTIME, how OBSTIME calculates certain values and parameters, and a description of the program and its scientific specifications. This text can be viewed in Appendix G.
Examples	Examples of running OBSTIME: inputs and outputs.
Changes	Changes to the OBSTIME interface since the last version of OBSTIME.
Keys	An explanation of the various function keys available to the user for using and moving around in the form.

?DESCR -- Provides users with a description or explanation of the variables name (i.e., LX = Broad Band Luminosity at the source). This information can be accessed by selecting the ?Descr menu item while the cursor is resting on the variable in question. A description of the variable will be displayed above the variable table.

RUN -- After selecting and reviewing the variables of a particular file, the user selects the Run option to run the OBSTIME program on the file. The variables for the file being viewed are extracted from the database and run through the OBSTIME program. The screen will blank and then the output of the OBSTIME program will be displayed. The user must hit the RETURN key after viewing the results to return to the menu. The execution time of the OBSTIME program is typically a few seconds. Error checking is performed on the values in the file prior to running the program. If an error occurs the user is notified and must fix the error before selecting Run again. Should the program abort, the user will be returned to the OBSTIME screen form. Intermediate files are prepared upon selection of the Run command. The files contain both the inputs and outputs for the OBSTIME program. These files are left in the workspace and can be viewed by the user at the operating system level outside of MIPS. These files may be perused by the user and mailed back to the user's home facility.

GETF -- Allows the user to retrieve an input variable file that has been previously saved. After selecting GetF, the user is shown a list of the files that he has saved in the database. The user should select one of the files listed. Any other input but the file number of one of the files listed will result in an error message. If the requested file has been saved, the new values will replace the previous values in the screen form. When using this option, the information that was previously displayed is lost, so if it is desirable to keep the previous inputs, they should be saved using SAVEF before using GETF.

SAVEF -- Allows users to save the variable values currently on the form to a database file. The user selects SaveF and is shown a list of available vacant files. The user is asked the number of the file to be created. The number must be one of the numbers listed, else an error message will be given. The user is not allowed to create a file on top of another file; the old file must first be deleted using DELF. An optional filename can be given to tag the file. On successful creation of the file, the new file number and name is then displayed on the screen.

DELF -- Allows the user to remove an input variable file that was saved to the database (i.e., completely delete its contents). The user is shown a list of the files existing in the database and is asked the number of the file to delete. The user is then told that the file will be deleted and then is asked whether to continue or not. If the user answers Y to this prompt, the file will be deleted. DelF does not affect the data displayed on the screen. The Clear menuitem clears the screen form.

LISTF -- List the parameter files that the user has saved in the database.

CLEAR -- Clears the fields in the form for new input.

EXAMINE -- Allows users to recall the results from running the OBSTIME program. The user can only examine results after the program has been run. After selecting Examine, the user is provided a new screen, shown in Figure 13a. On the top left of the screen form, the user will see a list of the files that have been run through OBSTIME (files available). Note that there can be a file number of 0, which is the file number given to any output file created by running OBSTIME on parameters that have not been saved to the database. Examine allows the user to display the output files on disk in the user's area. The file numbers correspond to the file number embedded in the output file name (i.e., f in OBSTnnnnf.OUT). The first file listed, first run is always displayed in the table on an initial select of Examine. Below this are the user's input, highlighted on the form. The only fields on the screen form that the user may change are the File Number and Run Number fields. The number of runs per file is given for the user's convenience after the input fields for file number and run. After filling in the file and run numbers in the respective fields, the DISPLAY menuitem is chosen in order to see the results of that particular run for that input file. When DISPLAY is chosen, the inputs for the file are retrieved into the INPUT table on the top right of the screen, and the output is placed into the OUTPUT table at the bottom of the screen. If the user is interested in examining another run of the same file, he should type the number of the new run in the highlighted field for the run number and select DISPLAY from the menu line to display this run. If the user is interested in examining another file, he should TAB to the file number field, type the number of the new file in the highlighted area, type the run number in the Run Number field, and then select DISPLAY from the menu line. The TAB key should toggle between the field for the run number and the field for the input file number. The ALL menuitem will cycle through all the files by pressing the RETURN key. The user may quit out of this loop at any time by typing in Q and pressing RETURN.

6.2.2 Descriptions of Parameter Codes at the Top of the Form

6.2.2.1 Specifying the Intensity

Four options for specifying the intensity of the source are provided: LX, the luminosity in erg/s at the source over some specified band; LM, the monochromatic luminosity at some energy; FX, the flux at the earth over some band; and SX, the flux density at some energy. After selecting one of these four, the user need only fill in values for the "intensity" and the respective band or energy in the table.

Intensity option	Energy specification
FX	BIO
SX	EO
LM	EE
LX	BIE

Values of the column density of neutral hydrogen (NH) may be specified in the table for absorption in our galaxy (NHG) and at the source (NHS), if luminosity (LX or LM) is given in the Intensity Code field. These are optional parameters and are always used if non-zero.

6.2.2.2 Specifying the Distance

The distance is required only if LX or LM is specified . If FX or SX is chosen, the distance field will disappear, as it is not needed. There are three choices for specification of distance. The first, DZ code, is entered if the distance and the redshift are known (z=0 for galactic or nearby galaxies; z is used only for cosmological corrections). The HQZ code is used if only the redshift is known. In this case, the OBSTIME program also needs to know the Hubble constant and the deceleration parameter. DHQ is used if the user knows the distance in Mpc. Q and H are entered as in HQZ.

6.2.2.3 Spectral Choices

Four spectral distributions are available: Power Law (PL), Exponential + Gaunt Factor (EG), Raymond-Smith Thermal (100% cosmic abundances) (RS), and Blackbody (BB). If PL is chosen, then ALPHA, the exponent of the power law will be requested. For the three thermal spectra, the user may input the temperature either as kT in keV or T in millions of degrees Kelvin. In the Temperature Code field, KT tells the program to allow the user to supply the temperature as keV, and T tells the program to allow the user to supply the temperature as millions of degrees Kelvin.

6.2.2.4 Selecting Detector Parameters

The focal plane detector can be either the PSPC or the HRI. This controls which of the following table parameters will be brought up into the table:

BO allows the user to specify up to five output energy bands for the PSPC. At least one band must be present. By default, whenever HRI is selected, there will only be one band from 0.02-2.5 keV.

EXBG is an optional parameter which allows the user to add an extra contribution to the background for each output band. This is provided in the event of trying to detect a discrete source embedded in extended emission or if excess background from other causes that might be present. The instrumental background built into the program is an estimate,and available for inspection by accessing the relevant file in TECSPEC.

FIL specifies whether or not the user wants the boron filter (PSPC only).

PSPC_RAD and **HRI_RAD** are the radius of the integration circle, which determines how much instrumental background goes into the calculation, and how many of the source counts will be counted (the point response function is used for this). Allowed values for the PSPC are 2", 4", 6"..., 90". For the HRI, HRI_RAD may take on values from 0.5" to 10" in 0.5" steps.

Table 5
OBSTIME Program Variables
PARAMETER: Distance

Variable	Range	Units	Description
DC	DZ, HQZ, or DHQ		DC - Distance Code: DZ=enter D and z, lum. distance and red shift (z=0 for galactic sources), HQZ=enter z, H, and Q, DHQ=enter D, H, and Q
D	0<D<E15	parsec	D - Luminosity Distance (parsec)
Z	0<z<=15.0		Z - redshift (=0 for galactic or nearby objects) Example: 0.639 The upper limit for the RS spectrum is z=3.0, the other 3 spectra have extended red shift capabilities to z=15.
H	0<H<500.	km/s/Mpc	H - Hubble Constant
Q	0<q<100.	real	q - Deceleration parameter

Table 6
OBSTIME Program Variables
PARAMETER: Intensity

Variable	Range	Units	Description
IC	LX, LM, FX, or SX		IC - Intensity Code: LX=Broad Band Luminosity @ source, LM=Monochromatic Luminosity @ source, FX=Broad Band Flux @ Earth, SX=Flux Density @ Earth
LX	0<LX<E60	ergs/s	LX - Broad Band Luminosity at the source. When selecting this variable, also enter values for BIE - 2 energies needed for source to define the band for the LX.
BIE	.02<E1<E2<10.0	keV	BIE - Band In Emitted at the Source, a pair of energies in keV which define the LX band. Allowed Range: 0.02<=E1<=E2<=10.0
LM	0<LM<E38	erg/s/Hz	LM - Monochromatic luminosity at the source, Example: 2.5E27 If selecting this option, also enter a value for EE - Emitted Energy.
EE	.02<EE<10.0	keV	EE - Emitted Energy at the source where LM is evaluated
FX	E-38<FX<E38	erg/cm^2/s	FX - Broad Band input flux at the Earth. When selecting FX, enter values for BIO, i.e. 2 energies needed to define the specified FX
BIO	.02<E1<E2<10	keV	BIO - Band in Observed at the Earth, allowed range: 0.02<=E1<=E2<=10.0. Defines the FX band.
SX	SX>E-38	erg/cm^2/s/Hz	SX - flux density at the Earth (erg/cm**2/s/Hz) Example: 3.35E-28 When selecting SX, also enter a value for EO - energy at the earth where FX is specified to determine source density.
EO	.02<EO<10.0	keV	EO - Energy Observed where SX is evaluated

Table 7
OBSTIME Program Variables
PARAMETER: Spectral

Variable	Range	Units	Description
ST	PL,EG,RS,BB		ST - Spectral Type Code: PL=Power Law, EG=Exponential and Gaunt, RS=Raymond Smith Thermal, BB=Black Body. Select one of these.
ALPHA	-1 to +5	real	ALPHA - Exponent of power law energy spectrum. ALPHA is used only when PL has been selected for the ST variable.
KT	.02<kT<10.0	keV	kT - Temperature in keV. kT is used by OBSTIME when the variable T=0. kT is used only when spectra RS, EG and BB are specified.
NHS	0<NHS<E30	cm^{-2}	NHS - Column density of Hydrogen in the source. If Flux or Flux Density (FX or SX) are specified then Z=0 and NHS=0.
NHG	0<NHG<E30	cm^{-2}	NHG - Column density of hydrogen in our galaxy
T	0.1<T<199.0	E6 deg K	T - Temperature in millions Deg K for RS, BB, EG. T is used if RS, BB, or EG has been specified for ST and kT=0. T*0.0861 is calculated for use in the program.

Table 8
OBSTIME Program Variables
PARAMETER: Experiment

Variable	Range	Units	Description
OC	SN or TIM		OC - Output code: SN: input signal to noise and calculate the exposure time. TIM: input the exposure time and calculate the resulting signal to noise ratio.
EXPTIM	0<EXPTIM<1000.0	ksec	EXPTIM - Exposure time (ksec). If OC is given a value of TIM then the user should enter a value in EXPTIM meaning that signal/noise should be calculated.
S/N	0<S/N	real	S/N - Signal to noise ratio. If OC has SN entered in it, then SN should have a value entered into it, indicating that the program should use SN to calculate exposure time.
BO	.02<E1<E2<2.5	none	BO - Output bands <= 5 pairs of energies in keV. Each pair to satisfy 0.02<=E1<=E2<=2.5 Default Range: 0.05,0.5;0.5,1.0;1.0,2.0. If FPD=HRI, then BO must/will be .02 to 2.5 (1 pair only)
EXBG	0<EXBG<10000.0	c/ks/sqmin	EXBG - Excess background, <=5 values, one for each band(BO). Units are counts per 1000 seconds per square arcmin. EX: .0035
FPD	PSPC or HRI		FPD - Focal plane detector, PSPC or HRI
FIL	N or Y		FIL - Boron Filter (PSPC only) Yes or No.
RAD	2<radP<90 .5<radH<10	arcsec	RAD - For PSPC, allowed ranges of radius for the integration circle 2,4,6,8,..90 arcsec (i.e.,. even values only). For HRI, they are .5,1.0,1.5,2.0,...10.0 (i.e., half arcsec steps up to a maximum 10 arcs

6.2.3 OBSTIME Examples

A GALACTIC OBJECT

An astronomer wants to find the length of an exposure needed for an EINSTEIN source with a 0.2-4.5 keV flux of 3.2E-12 (cgs), in order to achieve a s/n ratio of 10 in each of 3 bands of the PSPC.

Since the flux is at the Earth, the distance code field is skipped. The blackbody spectral shape is chosen, since the source is thought to be a star. A temperature of T = 5E6 K is assumed. The defaults are used for the use of boron filter (No), and the integration area (30" radius), and zero excess background is given.

A. Thus the inputs are:

Top of the form:
- Output Desired: TIM
- Focal Plane Detector: PSPC
- Spectral Model Code: BB
- Temperature Code: T
- Intensity/Flux Code: FX

Table:
- FX = 0.320E-11
- BIO = 0.20 4.50
- T = 5.000E6 K
- NHG = 0.450E+18
- S/N = 10.00
- BO = 0.1,0.3 0.5,1.0 1.0,2.0
- EXBG = 0.0
- FIL = N
- PSPC_RAD = 30.0 arcsec

B. The screen form will be as follows:

ROSAT-MIPS OBSTIME INPUTS FORM File No.: 1 Filename: Galactic Star
Files in use: 1,2,4,5,7,9

Output Desired: TIM (SN or TIM) Focal Plane Detector: PSPC (PSPC or HRI)
Spectral Model Code: BB (PL,EG,RS,BB) Intensity/Flux Code : FX (LX,LM,FX,SX)
Temperature Code: T (KT or T)

user value	name	range	units
3.2E-12	FX	E-38<=FX<=E38	erg/cm^2/s
0.2,4.5	BIO	.02<=E1<E2<=10	keV
5.0	T	0.1<=T<=199.0	E6 deg K
4.5E17	NHG	0<=NHG<=E30	cm**-2
10.0	S/N	0<S/N	real
0.1,0.3 0.5,1.0 1.0,2.0	BO	.02<=E1<E2<=2.5	none
0.0	EXBG	0<=EXBG<=10000.0	c/ks/sqmin
N	FIL	N or Y	
30.0	PSPC_RAD	2.0 <= radP <= 90.0	arcsec

C. The output seen on the screen is:

BAND	0.10-0.30	0.50-1.00	1.00-2.00
Total cnts	105.	101.	100.
Backgrnd	2.33	0.446	0.150
Net cnts	102.	100.	100.
+/-	10.2	10.0	10.0
counts/sec	0.185E-01	0.822E-01	0.107
obs time (ksec)	5.52	1.22	0.934

D. The user output file is:

FILENAME: OBST10371.OUT

********** INPUT PARAMETERS **********

SCIENTIFIC INSTRUMENT (FOCAL PLANE DECTECTOR): PSPC

DESIRED OUTPUT: Exposure Time (TIM) for a signal/noise (S/N) of 10.00

SPECTRAL MODEL: Black Body (BB)
Temperature (millions of deg. Kelvin) : 5.000

INTENSITY PARAMETERS:

Parameter	Value	Description
FX0	.320E-11	Broad Band Flux at the Earth (ergs/cm**2/sec)
BIO	0.20 4.50	Energy Band Observed at Earth (keV)
NHG	0.450E+18	Neutral Hydrogen Column Density of Galaxy

INSTRUMENT PARAMETERS FOR PSPC:

Parameter	Value	Description
FIL	No	Boron Filter Requested?
PSPC_RAD	30.0	Radius of the integration circle used (arcsec)
BO	0.1,0.3 0.5,1.0 1.0,2.0	Output Energy Bands (keV)
EXBG	0.0	Excess Bkgd/band (Cts/ks/amin^2)

********** OUTPUT PARAMETERS **********

BAND	0.10-0.30	0.50-1.00	1.00-2.00
Total cnts	105.	101.	100.
Backgrnd	2.33	0.446	0.150
Net cnts	102.	100.	100.
+/-	10.2	10.0	10.0
counts/sec	0.185E-01	0.822E-01	0.107
obs time (ksec)	5.52	1.22	0.934

E. The Parameter file is usually not viewed by the user if he uses the MIPS interface, but is given for completeness:

```
! SPECTRAL PARAMETERS
spec.type       4          !1=PL, 2=exp+gaunt, 3=raymond, 4=BB
slope.or.kt     0.430      !slope or kt (depends on spectrum type.)
!
```

```
! NORMALIZATION PARAMETERS

! Intensity parameters:
norm.type       3                   !1=>bb_lum,2=>mon_lum,3=>bb_flux,4=>mon_flux
bb.lum          0.000E+00           !LX, ergs/sec (mul by D25 in the code)
lum.norm.band   0.20  2.00          !keV for LX band at the source
monoch.lum      0.000E+00           !LM, ergs/sec/hertz
monoch.energy   0.200E+01           !keV, where LM is evaluated
bb.flux.den     0.320E-11           !FX, BB flux at earth. ergs/cm**2/sec
flux.norm.band  0.20  4.50          !keV, for FX at the earth
monoch.flux     0.000E+00           !SX, flux density, ergs/cm**2/sec/hertz
flux.energy     0.200E+01           !keV, where SX is evaluated (at earth)
src.nh          0.000E+00           !NH at source
gal.nh          0.450E+18           !Galactic NH, def=1.0E19
!
! Distance parameters:
distance        0.000E+00           !parsecs
redshift        0.000E+00
!
! INSTRUMENT parameters:
fpd.code        0                   !0=> pspc, 1=>hri
energy.bands    0.1,0.3 0.5,1.0 1.0,2.0   !output bands
filter.flag     0                   !1=> yes, 0=> no
radius.int      30.000              !integration radius for PSPC--arcsec: def=30
!
! OUTPUT parameters:
do.flag         0                   !0=s/n in, time out; 1=time in, s/n out
obstime         0.0000              !seconds
flux.snr        10.00
xcess.bkrate    0.0
!
out.file    OBST10371.TMP
!
!The parameters below are the 'system parameters'----the user has no control over them---- so
!don't touch!!
out.print       1
numb.ebins      124
EBINS.FILE      ebins.dat
pc.to.cm        3.0856E18           !parsecs to cm.
norm.bin.width  0.02
ray.file        rayfile.dat
deb.file        T10bands.SRC
cross.sect.file abs_table.
eff.area.file   pearea.file
det.area.flag   0                   !0=> detector response is included in the
!                                   effective area file; 1=> not included
! this boron filter is the binary file we made from Jurgen's file which we received in March 1988.
filt.trans.file borfilt.bin
gain.prob.matrix gain_prob_table
prf.corr.file   pspc.prf
lt.corr         1.0
bk.rate.file    bk_dan.dat
```

A DISTANT CLUSTER OF GALAXIES

It is desired to estimate the s/n for a cluster at 3000 Mpc, assuming it has a 2-10 keV luminosity of 5E44 erg/s, and kT = 15 keV. The spectrum is assumed exponential. The HRI is needed and the radius of integration choosen to be 10 arcsec. A 7000 sec exposure is asked for.

A. Thus the inputs are:

Top of the form:

Output Desired:	SN
Focal Plane Detector:	HRI
Spectral Model Code:	EG
Temperature Code:	KT
Intensity/Flux Code:	LX
Distance Code:	DZ

Table:

LX = 0.500E+45
BIE = 2.00 9.99
KT = 15.000 keV
NHS = 0.000E+00
NHG = 0.450E+18
D = 0.300E+10 parsec
Z = 0.460
EXPTIME = 7.0000 ksec
EXBG = 0.0
BO = 0.02 2.5
HRI_RAD = 10.0 arcsec

B. The screen form will be as follows:

ROSAT-MIPS	OBSTIME INPUTS FORM	File No.: 4 Filename: Galactic Cluster
		Files in use: 1,4,6,7
Output Desired:	SN(SN or TIM)	Focal Plane Detector: HRI (PSPC or HRI)
Spectral Model Code:	EG(PL,EG,RS,BB)	Intensity/Flux Code : LX (LX,LM,FX,SX)
Temperature Code:	KT(KT or T)	Distance Code: DZ (DZ,HQZ,DHQ)

user value	name	range	units
5.0E44	LX	0<LX<=E60	ergs/s
2.0, 9.99	BIE	.02<=E1<E2<10.0	keV
15.0	KT	.02<=kT<=10.0	keV
4.5E17	NHG	0<=NHG<=E30	cm**-2
0.0	NHS	0<=NHS<=E30	cm**-2
3.0E9	D	0<=D<=E15	parsec
0.46	Z	0<=z<=15.0	real
7.0	EXPTIM	0<EXPTIM<=1000.0	ksec
0.0	EXBG	0<=EXBG<=10000.0	c/ks/sqmin
10.0	HRI_RAD	0.5 <= radH <= 10.0	arcsec

C. The output seen on the screen is:

BAND	0.02-2.50
Total cnts	135.
Backgrnd	2.83
Net cnts	132.
+/-	11.6
counts/sec	0.188E-01
SNR	11.4

D. The user output file is:

FILENAME: OBST10374.OUT

********** INPUT PARAMETERS **********

SCIENTIFIC INSTRUMENT (FOCAL PLANE DECTECTOR): HRI

DESIRED OUTPUT: Signal/Noise (SN) for exp. time (EXPTIM) of 7.0000 ksec

SPECTRAL MODEL: Exponential with Gaunt Factor (EG)
Temperature (keV) : 15.000

INTENSITY PARAMETERS:

Parameter	Value	Description
LX0	.500E+45	Broad Band Luminosity at Source (ergs/sec)
BIE	2.00 9.99	Emitted Energy Band for defining LX (keV)
NHS0	.000E+00	Neutral Hydrogen Column Density at Source
NHG0	.450E+18	Neutral Hydrogen Column Density of Galaxy

DISTANCE PARAMETERS:

Parameter	Value	Description
D0	.300E+10	Distance in Parsecs
Z0	.460	Redshift

INSTRUMENT PARAMETERS FOR HRI :

Parameter	Value	Description
HRI _RAD	10.0	Radius of the integration circle used (arcsec)
BO	0.02 2.5	Output Energy Bands (keV)
EXBG	0.0	Excess Bkgd per band (Cts/ksec/arcmin^2)

********** OUTPUT PARAMETERS **********

BAND	0.02-2.50
Total cnts	135.
Backgrnd	2.83
Net cnts	132.
+/-	11.6
counts/sec	0.188E-01
SNR	11.4

E. The Parameter file is usually not viewed by the user if he uses the MIPS interface, but is given for completeness:

```
! SPECTRAL PARAMETERS
spec.type          2                    !1=PL, 2=exp+gaunt, 3=raymond, 4=BB
slope.or.kt        15.000               !slope or kt (depends on spectrum type.)
!
! NORMALIZATION PARAMETERS
! Intensity parameters:
norm.type          1                    !1=>bb_lum,2=>mon_lum,3=>bb_flux,4=>mon_flux
bb.lum             0.500E+20            !LX, ergs/sec (mul by D25 in the code)
lum.norm.band      2.00  9.99             !keV for LX band at the source
monoch.lum         0.000E+00            !LM, ergs/sec/hertz
monoch.energy      0.200E+01            !keV, where LM is evaluated
bb.flux.den        0.100E-10            !FX, BB flux at earth. ergs/cm**2/sec
flux.norm.band     0.50  3.00           !keV, for FX at the earth
monoch.flux        0.000E+00            !SX, flux density, ergs/cm**2/sec/hertz
flux.energy        0.200E+01            !keV, where SX is evaluated (at earth)
src.nh             0.000E+00            !NH at source
gal.nh             0.450E+18            !Galactic NH, def=1.0E19
!
! Distance parameters:
distance           0.300E+10            !parsecs
redshift           0.460E+00
!
! INSTRUMENT parameters:
fpd.code           1                    !0=> pspc, 1=>hri
energy.bands       0.02,2.5             !output bands
filter.flag        0                    !1=> yes, 0=> no
radius.int         10.000               !integration radius for HRI -- arcsec: def=10
!
! OUTPUT parameters:
do.flag            1                    !0=s/n in, time out; 1=time in, s/n out
obstime            7000.0000            !seconds
flux.snr           0.00
xcess.bkrate       0.0
!
out.file       OBST10374.TMP
!
! The parameters below are the 'system parameters'----the user has no control over them---- so
!don't touch!!
out.print          1
numb.ebins         124
EBINS.FILE         ebins.dat
pc.to.cm           3.0856E18!parsecs to cm.
norm.bin.width     0.02
ray.file           rayfile.dat
deb.file           t11PLLMM2.spc
cross.sect.file    abs_table.
eff.area.file      hearea.file
det.area.flag      0                    !0=> detector response is included in the
!                                       effective area file; 1=> not included
filt.trans.file    hfilt_eff.table
gain.prob.matrix   hgain_prob_table
prf.corr.file      hri.prf
lt.corr            1.0
bk.rate.file       hbk.file
```

6.3 TECSPEC - TECHNICAL SPECIFICATIONS PROGRAM

TECSPEC contains data relating to the ROSAT hardware specifications and performance (both predicted and measured) which will be required for mission planning. The tables contain data that will be useful in running the OBSTIME and VIEWING programs and in preparing proposals for observations with ROSAT. There are two types of forms that will be seen on the terminal screen. These are selection menus and the data table display forms. The main menu of TECSPEC is shown in Figure 14; a schematic diagram of the entire TECSPEC facility is shown in Figures 15 and 16.

TECSPEC MENU

*** HELP - Help for the TecSpec Menu**
*** MIRROR - Description and technical specifications for the Mirror**
*** STARTRACKERS - Technical specifications for the Star Trackers**
*** PSPC - Technical specs for the Position Sensitive Proportional Counter**
*** HRI - Technical specifications for the High Resolution Imager**
*** PHYSQUAN - Various Physical Quantities useful for ROSAT proposals**
*** END - Return to the TOOLS menu**
*** QUIT - Log out of MIPS**

Help(PF2) Mirror(2) StarTrackers(3) PSPC(4) HRI(5) > :

Figure 14. TECSPEC MAIN MENU

Selection menus allow the user to select different hardware specifications which will be displayed in tables in the data table display forms. **All of the items in the menus will eventually have data tables, but as of now, only the menu items with * have data.**

The data forms come up on the screen with data already loaded into the columns of a table. Each column will have an appropriate heading. The screen forms with the data tables also have brief explanatory text and supplementary information such as the time interval of applicability of the data, the source of the data and who supplied the data for the ROSAT TECSPEC database, the last time the data was modified, and who performed the modification.

A number, called the serial number, also will be presented on the form. This number is an integer greater than or equal to zero that will increment as new data is acquired for the tables in the database. A suggested scheme as to how this number will be incremented follows (this is preliminary and subject to change):

Version 0 -- the predicted behavior,
Version 1 -- from ground calibration,
Version 2 -- from in-flight check out,

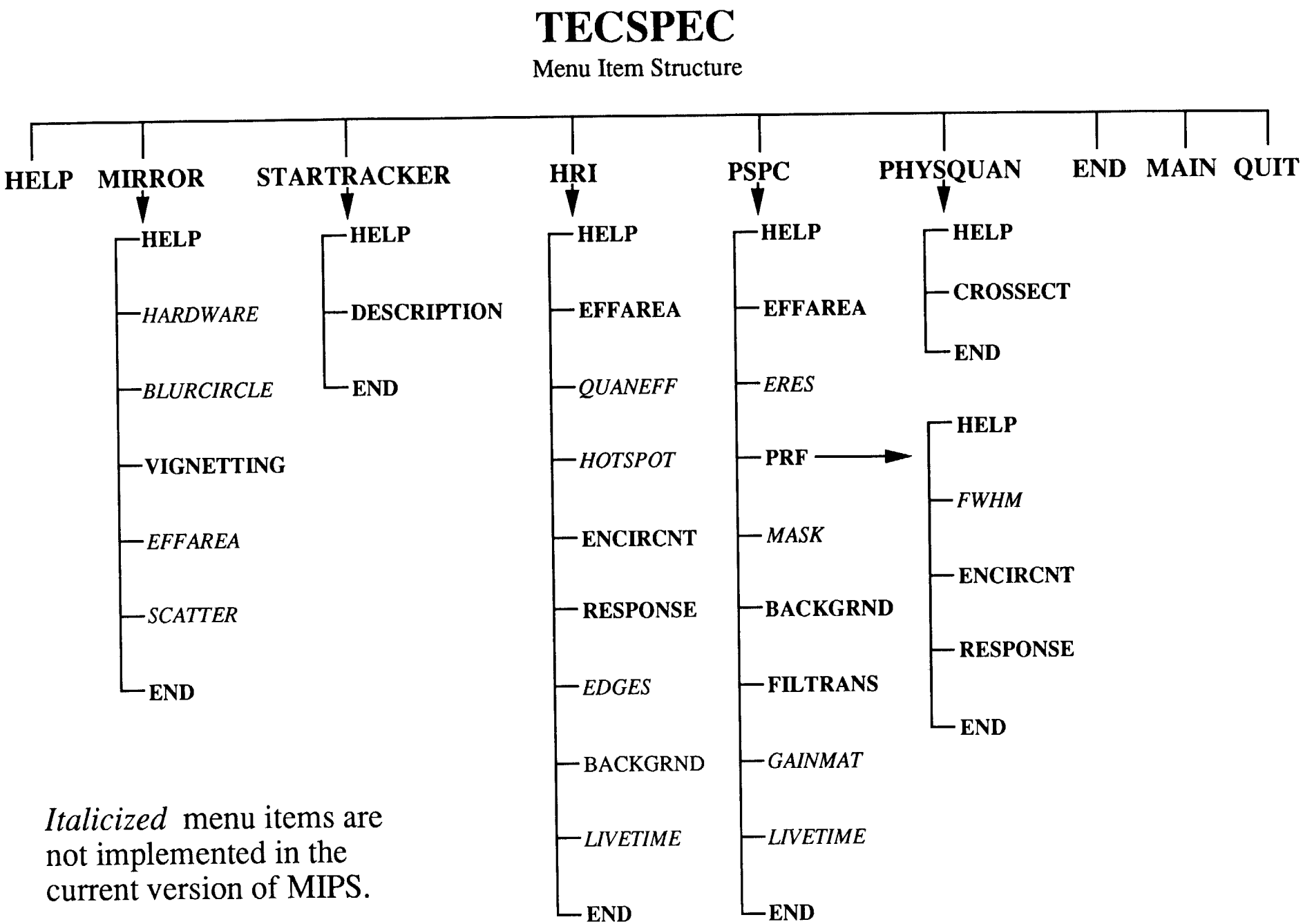

Figure 15. TECSPEC Menu Item Structure

Within each TECSPEC data menu, the following menu options are available:

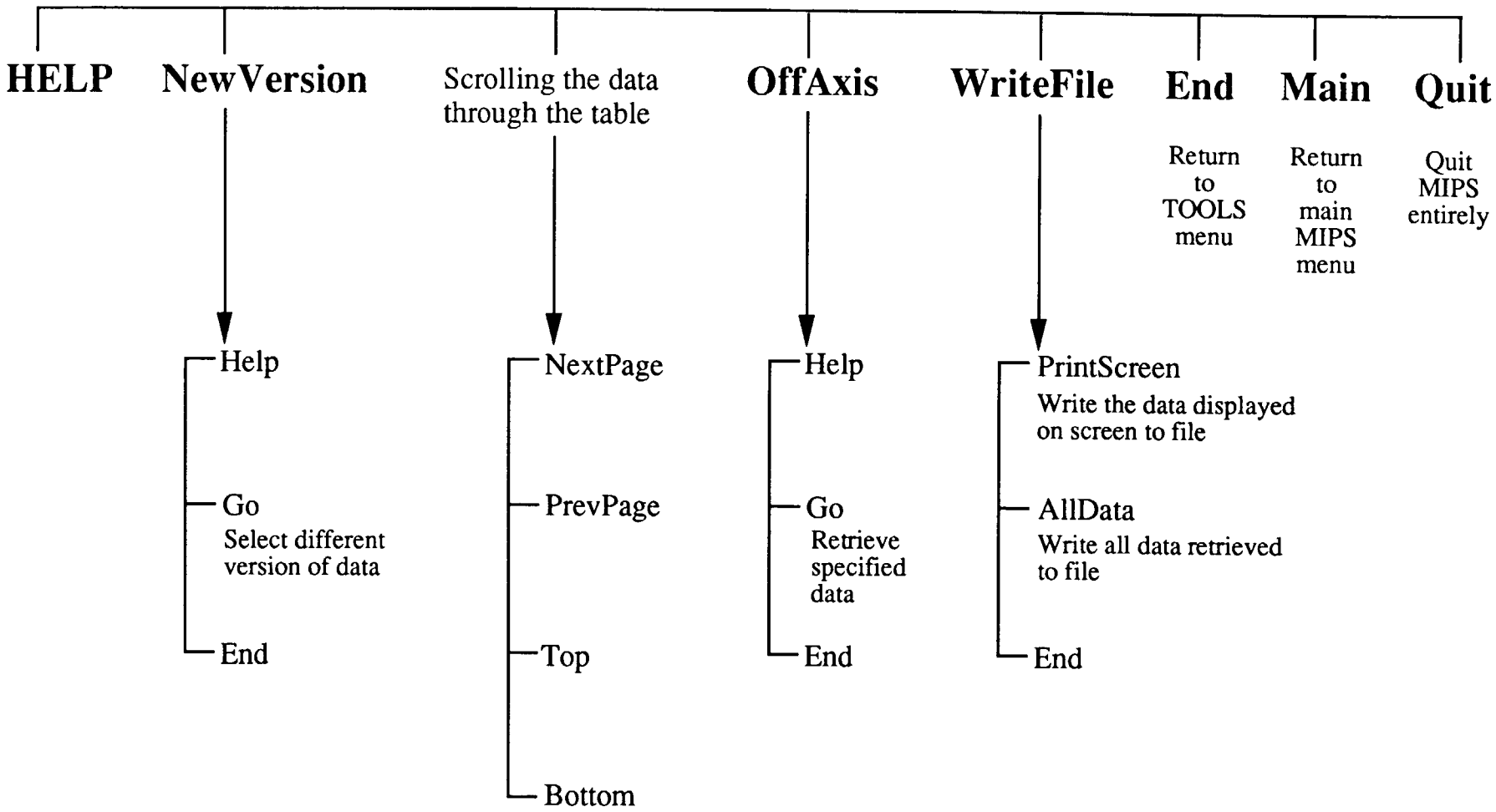

Figure 16. TECSPEC Menu Item Display Options

.
.
.
Version i for a time interval when the high voltage settings were incorrect,
.
.
. etc.

A given table may thus have n (serial) versions. All screen forms will appear with:

Serial number (version)	=latest
Off-axis distance	=0 (on-axis)
Energy	=1 keV

Essentially, the user types in the menu item or a minimum match for it at the prompt. The user must press PF1 or ESCAPE (depending on the terminal being used) first to get the prompt on the menu line. Alternately, if the terminal has a keypad, the user can press the key in parentheses to the right of the number on the keypad. The following is a description of the menu items that have been implemented. These items correspond to Figure 15 and 16.

HELP -- Includes general help for TECSPEC, how to select menu items, and the contents of the TECSPEC main menu. It is subdivided into two further menu items: WHATTODO (this text), and KEYS (this shows various functions that various keys are mapped to).

MIRROR -- Includes a general description of the mirror and technical specifications. Also included is the Vignetting Table at 1 keV. This is the correction for vignetting for various distances off-axis in arcminutes. This table is a model calculation and is for 1.0 keV only.

STARTRACKER -- Includes a general description of the Star Trackers and technical specifications.

PSPC -- Includes a general description of the Position Sensitive Proportional Counter (PSPC) and technical specifications for the instrument. Also included are the following submenu options: the Effective Area (EFFAREA), the Point Response Function (PRF), the Background Rates (BACKGRND), and the Filter Transmission (FILTRANS). EFFAREA refers to the effective area of the mirror/PSPC combination in cm^2 as a function of energy from 0.05 to 2.3 keV with the associated wavelength given in Angstroms. This is based on the effective area of the mirror folded with the PSPC response (i.e., absorption by the detector window). PRF refers to the Point Response function of the mirror/PSPC combination and contains two options: ENCIRCNT and RESPONSE. ENCIRCNT is the encircled fractional energy within a circle of a given radius (in arcseconds). This is for a nominal gain. RESPONSE defines the radial brightness response of the Point Response Function (PRF). The PRF is given as a function of radius in arcseconds. Since the characteristics of this instrument are unknown as of yet, the PRF is largely to be determined. The BACKGRND table provides counts per 10E6 seconds per square arcminutes per .02 keV energy bin. It is to be determined how the background counts will depend on the high voltage (PHA channel), if at all. This table is an estimation for serial version 1. Later versions of the table will be available after PSPC testing and in flight readings. FILTRANS determines the transmission through the Boron filter as a function of energy in keV.

HRI - Includes a general description of the High Resolution Imager (HRI) and technical specifications for the instrument. Also included are the following options: the Effective Area of the mirror/HRI combination (EFFAREA), the Encircled Energy Counts (ENCIRCNT), and the Point Response Function of the mirror/HRI combination (RESPONSE). The EFFAREA data are a convolution of the mirror effective area and the HRI response. The areas are in cm^2 and are listed as a function of energy in keV. The corresponding wavelength in Angstroms is also given. ENCIRCNT provides the encircled fractional energy within a circle of a given radius (in arcseconds). RESPONSE is equivalent information to ENCIRCNT, but may be preferable for some applications. It defines the radial brightness response of the Point Response Function (PRF). The PRF is given as a function of radius in arcseconds on axis. Since minimal scattering wings are expected, it is assumed that the PRF will not be a function of energy.

PHYSICAL QUANTITIES -- Includes a description of the various physical quantities useful for ROSAT proposals. Also included is the CROSSECT option which determines Absorption Cross Sections needed to calculate the attenuation from the neutral hydrogen density column as a function of energy in energy bins.

The data displayed on the screen forms are not all of the data, only the first few rows. The form gives the total number of data rows in the table (underlined). This value will give the user a rough idea of how many pages of data there are. This is calculated by dividing the total number of rows by the number being displayed. Other menu items are available to help the user view the data retrieved or print the data to a file. These appear after a major menu item, i.e. menu items that ask for specific TECSPEC data, has been selected. They are as follows:

Top --Position the cursor to the top row of the data.

Bottom -- Position the cursor to the bottom row of the data.

PrevPage -- Scroll the data to the previous page of data (a page being the number of rows displayed.)

NextPage -- Scroll the data to the next page of data.

WriteFile -- Write the data into a file in the user's default work space. This menu item is subdivided into the following menu items:

PrintScreen -- Print the current screen into a file. This will print the data currently displayed plus the textual data on the screen.

AllData -- Print all of the data into a file, minus the supplementary information on the form.

End --Quit without writing to a file.

End -- Go to the previous selection menu.

Main -- Go to MIPS main menu.

Quit -- Quit from MIPS into the operating system.

There are various ways to scroll through a data table; using the up and down arrows (if the terminal has them) when the cursor is within the table, using the RETURN key within the table (this has the

same effect as using the down arrow key), using the menu items **Top, Bottom, PrevPage**, and **NextPage**. The first two options scroll through the data one row at a time. The **PrevPage** and the **NextPage** menu item display a whole new screen of data. They both put up a whole new screen of data. The **Top** menu item goes to the first row of data and **Bottom** goes to the last data item. The cursor will be placed on the menu line when the form is entered. When the cursor is on the menu line, the **RETURN** key places the cursor back on the first row of the data. The **TAB** key will go to the first row of the data table whenever the cursor is on another row. The **PF1** key on VT100 (or ESCAPE on some terminals) positions the cursor back on the menu line for input after a RETURN.

Some specific menu items exist for special TECSPEC data tables including **NewVersion** and **OffAxis. NewVersion** allows the user to select a different version of the data than the version that initially appears. By default the latest version is placed into the TECSPEC screen form. All menu items for TECSPEC data tables will have a submenu item of **NewVersion. OffAxis** allows the user to view the data for different off-axis values for the HRI and the PSPC. By default the off-axis value is 0 (which is actually on-axis values) when the data table is initially shown. **OffAxis** will also retrieve values for the *current* serial number. **OffAxis** appears as a submenu when the user selects HRI-ENCIRCNTS or HRI-RESPONSE for the HRI and for the PSPC it will appear under PRF-ENCIRCNTS and PRF-RESPONSE. Each of these menu items will display a form with a table of values, serial number for **NewVersion** and off-axis distance for **OffAxis**, to be selected by placing the cursor on the value the user wishes retrieved.

6.3.1 MIRROR - Technical Specifications for the Mirror of the ROSAT XRT

This menu contains data relating to the ROSAT mirror hardware specifications (both predicted and measured) which are required for mission planning. The mirror specifications, except for the vignetting table, have not been implemented since immediate use of the mirror alone is not required. For information such as effective area of the mirrors, use the menu selection for effective areas for the scientific instrument of interest (i.e., the HRI or PSPC).

HELP -- Help and a general description of the mirror.

DESCRIPTION -- A general description of the mirror.

VIGNETTING -- Vignetting Table at 1 keV. This is the correction for vignetting for various distances off-axis in arcminutes. This table is a model calculation and is for 1.0 keV only.

END -- Return to the TECSPEC main menu

6.3.1.1 *Description*

Source: Excerpted from B Aschenbach - 31st SPIE: AUG87 via D. Harris (SAO)
Dates of Applicability: 1 September 88 - Present

Modified out of journal context (no figures, photos, pages) by Jeff Mullins with additions for clarity in [].

The material presented here is taken from Bernd Aschenbach: "Design, Construction and Performance of the ROSAT High Resolution X-ray Mirror Assembly", an invited talk presented at the 31st SPIE Annual International Symposium, San Diego, August 1987 and submitted to

Applied Optics. Preprints from Aschenbach, Max Planck Institut fur Physik und Astrophysik, 8046 Garching bei Munchen, West Germany.

ABSTRACT:

For the X-ray astronomy satellite ROSAT a grazing incidence telescope has been developed including a verification and a flight model. The telescope consists of a fourfold nested Wolter type I mirror assembly of 84 cm front aperture and 240 cm focal length. The verification model (VM) has been built and fully assembled to a telescope. Full aperture X-ray measurements performed in our 130 meter long beam facility are presented and successfully compared with model predictions based on mirror metrology data. An energy independent angular resolution of 4 arcseconds half energy width for the encircled point spread function and a mirror surface microroughness of less than 3 angstroms have been achieved. Metrology of the actual flight mirrors although not yet assembled to a telescope indicate an even better performance.

FROM THE TEXT:

The crucial performance test is the full-aperture X-ray measurement of the integrated assembly in a parallel beam. The MPI 130 meter long beam facility has been used for these measurements with the X-ray source at a distance of 123 meter from the mirror assembly, thus providing a nearly parallel beam with a divergence of +/-11' though. The telescope focus has been sampled with a 30 micron wide pinhole, from which the encircled energy function, i.e., the radially integrated point spread function has been determined at various X-ray energies. The measured encircled energy function of the VM mirror assembly for on-axis X-rays of both 0.28 keV and 1.49 keV [has been measured.] ([This is shown in fig 15 in the preprint of the Applied Optics journal article. The] fig. shows the usual encircled energy function, rising to 0.5 @3"(circa); 0.85 @ 6"; and reaching 0.97 to 1.0 in the 12" to 15" range). 50% of the energy is reflected into a circle of 6" diameter, and 80% into a 10" diameter circle. A very minor change of the encircled energy function is noted between 0.28 keV and 1.49 keV, which demonstrates that X-ray scattering is almost totally negligible down to the few percent level. This is consistent with the pencil beam measurements of the individual mirror shells. It furthermore demonstrates that the X-ray pencil beam tests carried out on only a small fraction of the total mirror surface area are representative for the whole mirror.

The model has been used to compute the true encircled energy function for a perfect parallel beam thus unfolding the effects of the testing geometry. The result [can be] compared with the other two outstanding X-ray telescopes, i.e. the Einstein telescope and the Technology Mirror Assembly of NASA's Advanced X-ray Astrophysics Facility (AXAF TMA). The most rapid and thus the most narrow encircled energy function has been achieved for the AXAF TMA up to a level of 70% encircled energy. Beyond this level the AXAF TMA energy function tends to flatten whereas it continues to rise for the ROSAT VM and reaches 95% encircled energy at an image radius of 6", most probably due to the extraordinary low microroughness. The ROSAT VM results for the HEW (HALF-ENERGY WIDTH) and the 80% encircled energy diameter are 4" and 7.5" respectively, which are well below the specification upper limit of 5" and 10".

Although the flight telescope has not yet been assembled it is instructive to inspect the metrology data for a prediction of the encircled energy function using the model approach developed for the VM. Using the data as listed in table 2 including the detailed distributions and excluding significant mounting and alignment errors, the ROSAT FM (Flight Mirror) mirror assembly is likely to be finished at a value of 3" HEW with the same or even a somewhat steeper rise of the encircled energy function.

One of the outstanding achievements in the ROSAT mirror assembly program is the low mirror surface scattering, which entails an unprecedented image contrast for an X-ray telescope. Contrast is particularly useful for imaging extended sources of strong surface brightness variations. In

order to illustrate ROSAT's potential in this domain an image simulation of the quasar 3C 273 has been made by ray tracing using the VM point spread function. On optical images 3C 273 exhibits a faint jet like structure emanating from the central point like source. This jet has also been found in X-rays with the Einstein telescope at a 5 sigma detection level above the heavy scattering halo after an observation time of 78,000 seconds. The brightness of the jet is only 0.3% of the central source. [A] simulated image as it would be received with the ROSAT VM including the Gaussian resolution of the HRI detector with 3" FWHM [has been made]. The jet is clearly seen and if any substructures greater than a few arcseconds along the jet do exist they will be resolved by ROSAT. Apart from this particular example of the use of ROSAT it is hoped that X-ray astronomy in general and in many research fields will benefit soon from this mirror technology success.

6.3.1.2 *Mirror Vignetting*

This table shows the vignetting correction for the mirror as a function of various distances off axis in arcminutes. This is a model calculation and is the "zeroth" version, serial number 0. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc. The table with the data is shown on the right side of the screen, and supplementary information is shown to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table (the number is underlined).

6.3.2 Star Trackers - Technical Specifications for ROSAT Star Trackers

StarTrackers contains data relating to the ROSAT hardware specifications and performance (both predicted and measured) of the star trackers for the XRT. These values are required for mission planning and in preparing proposals for observations with ROSAT.

The Star Tracker attributes are as follows:

- Geometry - Each tracker has a FOV of 5.9x4.4 degrees, with the long side parallel to the y-axis (lines of constant ecliptic longitude). There are two trackers, with slightly overlapping areas. The instantaneous area covered by both trackers is a rectangle 4.4 x 10.15 degrees, with the target position 0.09 degrees inside the long edge facing the sun, along the center line of the 10.15 degrees.
- Magnitude - The limiting magnitude for guide stars is 6.5 or 7.0. Visual magnitude is specified in an early document; "instrumental magnitude" is a current term (JHS).

- Color - What is the sensitivity color wise of the star trackers? One report suggests that instrumental magnitude (i.e., the response of the tracker optics) is very close to visual magnitude. In that case, any color correction would be a second order effect.

- Multiplicity - At least two guide stars are required for an aspect solution. Which star tracker acquires the star is unimportant. JHS reports that from simulations at MPE, they expect at least five stars for almost all pointings.

- Uncertainty - If the star tracker requires isolated stars, what is the requirement for angular separation as a function of magnitude? Current specs indicate a separation of 0.1 degrees is required.

6.3.3 PSPC - Technical Specifications for the ROSAT PSPC

This menu item lists data relating to the hardware specifications and performance (both predicted and measured) of the Position Sensitive Proportional Counters (PSPCs). These values are also required for mission planning. The following menu items are implemented:

HELP -- This text, as well as general help for the PSPC menu form, how to select menu items, and the contents of the PSPC main menu.

EFFAREA -- Effective Areas (Mirror + PSPC). This is the effective area of the mirror and PSPC combination in cm^2 as a function of energy from 0.05 to 2.3 keV with the associated wavelength given in Angstroms. Based on the effective area of the mirror, folded with the PSPC response (absorption by the detector window, etc).

PRF -- The Point Response Function of the Mirror/PSPC combination. This selection leads to a submenu of 2 data tables. The following menu items have data tables at present:

ENCIRCNT -- The encircled fractional energy within a circle of a given radius (in arcseconds) for a nominal gain.

RESPONSE -- This is equivalent information to ENCIRCNT, but may be preferable for some applications. It essentially defines the radial brightness response of the Point Response Function (PRF). The PRF is given as a function of radius in arcseconds. Since the characteristics of this instrument are not known as of yet, the PRF is largely to be determined.

BACKGRND -- Background rates. This table gives counts/10E6 seconds per square arcminutes per 0.02 keV energy bin. It is yet to be determined how the background counts will depend on the high voltage (PHA channel) if at all. This table is an estimation for serial version 1. Later versions of the table will be available after PSPC testing and in flight readings.

FILTRANS -- Filter Transmission. The transmission through the Boron filter as a function of energy in electron volts.

6.3.3.1 *EFFAREA - The Effective Area of the Mirror + PSPC*

This table shows the effective area in cm^2 of the mirror/PSPC combination as a function of energy in keV on axis. The wavelength at each energy is also given in Angstroms. This is the "zeroth" version, serial number 0 appears initially. Later versions, denoted by increments of the serial

number, will be for in-lab measurements, calibrations from in flight, etc. The table with the data is shown on the right side of the screen, and supplementary information is placed to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This value will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table (the number is underlined).

6.3.3.2 *PRF - Technical Specifications for ROSAT PRF for the PSPC*

This is data relating to the Point Response Function (PRF) of the Position Sensitive Proportional Counters (PSPCs), and will be required for mission planning. This menu item provides the Point Response Function of the Mirror/PSPC combination. The following menu items are implemented:

HELP -- General help for the PSPCPRF menu form, and the contents of the PSPCPRF main menu.

ENCIRCNT -- The encircled fractional energy within a circle of a given radius (in arcseconds) on axis for a nominal gain.

RESPONSE -- This is equivalent information to ENCIRCNT, but may be preferable for some applications. It essentially defines the radial brightness response of the Point Response Function (PRF). The PRF is given as a function of radius in arcseconds.

6.3.3.2.1 *ENCIRCNT - Encircled Fractional Energy Counts for the PSPC*

This table shows the encircled fractional energy counts for the PSPC as a function of radius in arcseconds. The data is for an energy of 1.0 keV. The data will vary with the distance off axis. The table with the data is shown on the right side of the screen. The encircled fractional energy is in the last column on the right of the table. The values are from 0 at a radius of 0 to 1 (the full amount of energy) at the radius, where the Point Response Function falls to 0.

The serial number of the data and the distance off-axis in arcminutes are highlighted on the form. Also, the total number of data items (rows) retrieved into the data table is shown (this number is underlined on the screen form). In addition to the above, there is supplementary information which is to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).

- The standard deviations from the mean for

  a. The effect of changing the energy on the effective area of the PSPC
  b. Changing the distance off axis in relation to the mirror
  c. The aspect angle (a constant)
  d. The combination of (a) and (b) above.

Initially, these data are the "zeroth" version, serial number 0. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

6.3.3.2.2 *RESPONSE - The Relative Brightness Response of the PRF for the PSPC*

This table shows the Relative Brightness Response for the Point Response Function (PRF) of the Position Sensitive Proportional Counter (PSPC). The data is for an energy of 1.0 keV. The data will vary with the distance off-axis. The table with the data is on the right side of the screen, and supplementary information is to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.

- The date when the data was last modified and who modified it.

- The original source of the data and who delivered it to MIPS (the via).

- The standard deviations from the mean for

  a. The effect of changing the energy on the effective area of the PSPC
  b. Changing the distance off-axis in relation to the mirror
  c. The aspect angle (a constant)
  d. The combination of (a) and (b) above.

The serial number of the data and the distance off-axis in arcminutes are highlighted on the form. Also, The form gives the total number of data items in the field beneath the table. This is the first version, serial number 1. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

6.3.3.2.3 *OFFAXIS for the PSPC - Select the off-axis distance*

This screen allows the user to select an off-axis distance which will be used to obtain the data set for that off-axis distance. It is a submenu of the **ENCIRCNT** and **RESPONSE** menu items mentioned in sections 5.3.3.2.1 and 5.3.3.2.2 When the distance is chosen by placing the cursor on it and the **GO** menu item is selected, the new data set for that particular off-axis distance is displayed on the original form.

The cursor will be placed on an off-axis distance of 0 (i.e., actually on-axis) to start. This is the default for the screen form when it is first displayed. To select an off-axis distance, the user should move the cursor down with the DOWN ARROW key, or with RETURN if the terminal does not have arrow keys, until the cursor is on the off-axis distance corresponding to the data set to be displayed. The user then can press the keypad or function key corresponding to the GO

menu line item (this will be ENTER for VT100 type terminals and DO for VT220 type terminals). If the terminal does not emulate either of these types of terminals, then the user should press PF1 (or ESCAPE if the terminal does not have a keypad or function keys). This will place the cursor on the menu line. Now, the user can type **GO** or just **G** and hit the RETURN key. The data set for the off-axis data desired will be displayed on the screen. Note that on-axis (off-axis distance of 0) can be selected. This option is useful if an off-axis data set has been displayed, and the user wants to display the data for on-axis again. To quit without displaying another data set, the user should type **END** (or **E**) at the menu line prompt (PF3 on VT100 and VT220 emulated terminals). To go back into the table from the menu line, the user should press the RETURN key.

6.3.3.3 *BACKGROUND - Background Counts for the PSPC*

This table shows the background counts for the Position Sensitive Proportional Counters (PSPC). The counts are per 10^6 seconds per square arcminutes per 0.02 keV bins. The background is reckoned at the PSPC readout, i.e., after the redistribution function and after absorption by the window, etc. The table with the data is shown on the right side of the screen, and supplementary information is placed to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table is shown (the number is underlined). The first version, serial number 0, appears on the screen. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

6.3.3.4 *FILTRANS - Filter Transmission*

This table shows the transmission through the Boron filter of the Position Sensitive Proportional Counter (PSPC) as a function of energy in electronvolts. It is the *expected* transmission, not measured transmission. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

The table with the data is shown on the right side of the screen, and supplementary information is presented to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table (the number is underlined).

6.3.4 HRI - Technical Specifications for the ROSAT HRI

This menu item presents data relating to the hardware specifications and performance (both predicted and measured) of the High Resolution Imager (HRI), which will be required for mission planning. The tables will contain data that will be useful in running the OBSTIME and VIEWING programs and in preparing proposals for observations with ROSAT. The following menu items are implemented :

HELP -- This text, as well as general help for the HRI menu form, how to select menu items, and the contents of the HRI main menu.

EFFAREA -- Effective Area of the Mirror and HRI combination. These data are a convolution of the mirror effective area and the HRI response. The areas are in cm^2 and are listed as a function of energy in keV. The corresponding wavelength in Angstroms is also given.

ENCIRCNT -- Encircled Energy Counts. The encircled fractional energy within a circle of a given radius (in arcseconds).

RESPONSE -- The Point Response Function of the Mirror/HRI combination. This is equivalent information to ENCIRCNT, but may be preferable for some applications. It essentially defines the radial brightness response of the Point Response Function (PRF). The PRF is given as a function of radius in arcseconds. Since minimal scattering wings are expected, it is assumed that the PRF will not be a function of energy.

6.3.4.1 *EFFAREA - The Effective Area of the Mirror + HRI*

This table shows the effective area in cm^2 of the mirror/HRI combination as a function of energy in keV on axis. The wavelength at each energy is also given in Angstroms. The "zeroth" version, serial number 0 appears initially Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc. The table with the data is shown on the right side of the screen, and supplementary information is presented to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table (the number is underlined).

6.3.4.2 *ENCIRCNT - Encircled Fractional Energy Counts for the HRI*

This table shows the encircled fractional energy counts for the HRI as a function of radius in arcseconds. The table with the data is on the right side of the screen. The values are from 0 at a radius of 0 to 1 (the full amount of energy) at the radius, where the Point Response Function falls

to 0. The distance off-axis in arcminutes is highlighted on the form. Also, the total number of data items (rows) retrieved into the data table is shown (the number is underlined). In addition to the above, there is supplementary information which is to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The standard deviations from the mean for

  a. The effect of changing the energy on the effective area of the HRI
  b. Changing the distance off axis in relation to the mirror
  c. The aspect angle (a constant)
  d. The combination of (a) and (b) above.

Initially, these data are the "zeroth" version, serial number 0. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

6.3.4.3 *RESPONSE - Relative Brightness Response of the PRF for the HRI*

This table shows the Relative Brightness Response of the Point Response Function (PRF) for the High Resolution Imager (HRI). Initially appearing is the "zeroth" version, "serial number" 0. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc. The table with the data is on the right side of the screen, and supplementary information is to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The standard deviations from the mean for

  a. The effect of changing the energy on the effective area of the HRI
  b. Changing the distance off-axis in relation to the mirror
  c. The aspect angle (a constant)
  d. The combination of (a) and (b) above.

- The distance off axis in arcminutes is highlighted on the form.
- The total number of data items (rows) retrieved into the data table is shown (the number is underlined).

6.3.4.4 *OFFAXIS for the HRI - Select the off-axis distance*

This screen allows the user to select an off-axis distance which will be used to obtain the data set for that off-axis distance. It is a submenu of the **ENCIRCNT** and **RESPONSE** menu items mentioned in sections 5.3.4.2 and 5.3.4.3. When the distance is chosen by placing the cursor on it and the **GO** menu item is selected, the new data set for that particular off-axis distance is displayed on the original form.

The cursor will be placed on an off-axis distance of 0 (i.e., actually on-axis) to start. This is the default for the screen form when it first came up. To select an off-axis distance, the user should move the cursor down with the DOWN ARROW key, or with RETURN if the terminal does not have arrow keys, until the cursor is on the off-axis distance corresponding to the desired data set. The user should then press the keypad or function key corresponding to the GO menu line item (this will be ENTER for VT100 type terminals and DO for VT220 type terminals). If the terminal does not emulate either of these types of terminals, then the user should press PF1 (or ESCAPE if the terminal does not have a keypad or function keys). This action will place the user on the menu line. Now, the user can type **GO** or just **G** and hit the **RETURN** key. The data set for the off-axis data desired will then be displayed on the screen. Note that the user can select on-axis (off-axis distance of 0). This action is useful if the user has displayed an off-axis data set and wishes to display the data for on-axis again.

6.3.5 PHYSQUAN - Physical Quantities for TecSpec

The **PHYSQUAN** menu contains data relating to the various physical quantities of use in running the OBSTIME and VIEWING programs and in preparing proposals for observations with ROSAT. It was decided to omit tables for physical constants, Gaunt Factors, and conversion factors from the **PHYSQUAN** section of TECSPEC since they have nothing to do with ROSAT and can be safely hardwired into programs. At this time, the only menu item appearing is **CROSSECT**, the absorption cross sections needed to calculate the attenuation from the neutral hydrogen density column as a function of energy in energy bins.

6.3.5.1 *CROSSECT - Absorption Cross Sections*

This table shows the absorption cross sections needed to calculate the attenuation from the neutral hydrogen column as a function of energy in keV. This is the first version, serial number 1. Later versions, denoted by increments of the serial number, will be for in-lab measurements, calibrations from in flight, etc.

The table with the data is shown on the right side of the screen, and supplementary information is presented to the left of the table. The supplementary information is composed of the following:

- The period of applicability of this data, i.e., the first date that the data is applicable to the last date. As of now, the last date is "present". This will change when new serial versions (serial numbers) of the data become available. It is planned that all versions will be available to the user for viewing.
- The date when the data was last modified and who modified it.
- The original source of the data and who delivered it to MIPS (the via).
- The total number of data items (rows) retrieved into the data table.

6.4 PRECESS - PRECESSION PROGRAM

The PRECESSION program precesses coordinate values (Right Ascension and Declination) to the desired epoch of a target.

After selecting 'Precess' from the TOOLS menu, the user is presented with the PRECESSION screen form. The PRECESSION screen form allows a user to enter values for the location of a target (Right Ascension and Declination), the epoch of the target, and the desired epoch of the target in the upper portion of the screen. Once these input values are entered and the PRECESSION program is run, the output portion of the screen form will display the coordinate values precessed to the desired epoch.

The cursor is positioned initially in the 'Target Position' field where the user must enter the Right Ascension and Declination of a target. The user should enter the values of RA and DEC within their appropriate ranges, otherwise the user is informed that the value entered is outside the allowed range. When entering a negative declination, the user should enter a negative sign in all of the Declination fields. When a 0 occurs in a field, a negative sign is not necessary. Next, values for 'Epoch of Target' and 'Desired Epoch' are entered by the user. Users can enter position values as real or integers. By default, precession will be calculated from the 1950 epoch for a desired epoch of 2000. For example, if a user would like to calculate the mid-1989 coordinate values for a target with a 1950 epoch, he would enter '1950.0' in the 'Epoch of Target' field and '1988.5' in the 'Desired Epoch' field. The precession program would calculate the new location for the middle of 1988. '1950.0' and '2000.0' are the default epochs, respectively, which are entered automatically in the epoch fields. If a year before or after these (i.e., '1949.6' or '2000.1') is entered, the precession program will not run and the following message will be displayed:

'Epoch should be between 1950 and 2000 [HIT RETURN]'

Menu Items:

RUN -- The coordinate values for the new location (based on the epoch the user has entered) will be calculated and displayed in the lower portion of the screen.

BLANK -- Clears the screen of existing values for Target Position, Epoch of Target, and Desired Epoch and returns the cursor to the initial field (RA Hrs.) where new values can be entered.

HELP -- Displays this text.

END -- Returns the user to the TOOLS menu.

EXIT -- Returns the user to the system level.

Additionally, to return from the menu line to the input fields at any time, simply press **RETURN** or **ENTER**.

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Program: PRECESS
User Name: JBEHNKE
Run Date: 21-MAR-89

PRECESSION

INPUTS: Enter target position, target epoch and epoch desired.
Use TAB key to move from field to field. Enter target position
and epochs, then select RUN from the menu to precess the coordinates.

Target Position: RA Hrs: 0 DEC Deg: -79 Please indicate (-) in all DEC fields
Min: 39 Min: -30
Sec: 14.4 Sec: -47.6

Epoch of Target: 1950.0 Desired epoch: 2000.0

OUTPUTS:

New Position: RA Hrs: 0 DEC Deg: -79
Min: 40 Min: -14
Sec: 46.26 Sec: -20.57

Help(PF2) Blank(2) Run(3) End(PF3) Main(0) Quit(PF4):

Figure 17. PRECESSION Screen Form

6.5 ECLTRANS - Transform Right Ascension and Declination to Ecliptic Coordinates.

This screen form allows the user to transform equatorial coordinates to ecliptic coordinates and vice-versa. That is,

INPUT		OUTPUT
Right Ascension and Declination	---------->	Ecliptic Longitude and Latitude
	or	
Ecliptic Longitude and Latitude	---------->	Right Ascension and Declination

Input is typed into the area on the form labelled INPUT, and the output is displayed below in the area labelled OUTPUT. If the user wants to convert right ascension and declination to ecliptic longitude and latitude, enter the right ascension and declination leaving the ecliptic coordinates blank. If the user wants to convert ecliptic coordinates to right ascension and declination, enter the ecliptic coordinates (on the right side of the form) leaving the right ascension and declination fields (on the left side of the form) blank. Information on one side of the form does not affect the results on the other side of the form. That is, the output corresponds to the input directly above it, and is unaffected by any other coordinates entered.

The epoch of the coordinates must be entered in decimal years, i.e., 1950.0, 1950.5, 2000.0, etc. The epoch must be positive, and must be less than 3000.0. The input epoch for right ascension and declination defaults to 1950.0.

Right ascension and declination are to be entered in hours, minutes, and seconds (from 0h 0m 0s to 23h 59m 59.99s) and degrees, minutes, and seconds (from -90d to +90d), respectively. A negative declination can be entered with the minus sign in the degrees field only, or in all three fields: degrees, minutes, and seconds. If the degrees are 0, then the user must enter negative numbers in both the minutes and seconds fields to obtain the correct answer. If the minutes field is also 0, the minus sign must appear in the seconds field. The ecliptic latitude and longitude are to be entered in decimal degrees with the longitude between 0 and 360 and the latitude between -90 and +90.

After the user has filled in the coordinate fields for either the left or right side of the form, executing the **RUN** menu item will transform the coordinates and display the results in the OUTPUT part of the form (lower portion). Output for the right ascension will be in hours, minutes, and seconds; output for the declination will be in degrees, minutes, and seconds. The output for the ecliptic latitude and longitude will be in decimal degrees. A negative declination will have the minus sign in the degrees field only.

The menu items are as follows:

HELP -- This text, or an explanation of INGRES defined function and control keys if the KEYS menu item is selected.

BLANK -- Blank the form for new input.

RUN -- Run the program to transform the coordinates.

END -- Return to the **TOOLS** menu.

6.6 PSPCEXPTIME - PSPC Survey Exposure Time

This screen form shows the exposure time needed for pointed observations using the PSPC as a function of ecliptic latitude. The exposure time given is twice the calculated median exposure time of the PSPC during the survey phase. It is recommended that twice the exposure time be used during the pointed observation phase to make the proposed observation different enough from the survey so as to increase the chance of being selected for ROSAT time.

The first column has the ecliptic latitude given in one degree increments starting from -89.5 degrees and going to +89.5 degrees. The second column gives twice the exposure time that will be used for the PSPC during the survey phase in seconds corresponding to the latitude given.

The standard menu items have been implemented in PSPCEXPTIME; these items include **HELP**, **NEXTPAGE**, **PREVPAGE**, **TOP**, **BOTTOM**, **WRITEFILE**, **END**, and **QUIT**.

7. USING THE BULLETIN BOARD

The ROSAT Bulletin Board contains messages of immediate importance to the Project such as observation plans, calibration and sensitivity information, announcements of opportunity, data problems, etc.

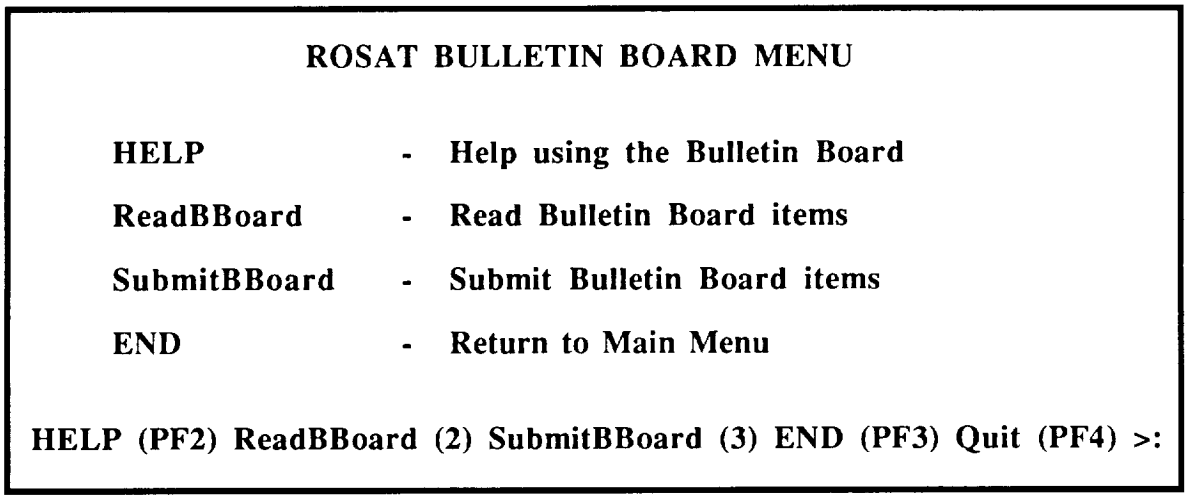

Figure 18. BULLETIN BOARD Main Menu

For example, if the Read BBoard option is chosen, the user is given a listing of the dates and titles of the messages on the bulletin board. Submitted messages are sent to the MIPS team who will review them with the Guest Observer Support Group. Within a day, the messages will be entered into the Bulletin Board System.

7.1 READING THE BULLETIN BOARD

After the ***READ*** option is selected and the bulletin board summary is displayed, a user may choose menu item ***SELECT*** to read a particular item. A selection is made by moving the cursor to the number of the message and then choosing ***SELECT.*** A new screen form displays the message. To read the entire text use the DOWN ARROW key to go to the bottom of the file a line at a time, or use ***NextPage*** to get to the end of the page. The user can select ***END*** to return to the message grid.

After reading a message the user should select the ***END*** option which returns to the previous screen listing. To return to the main menu the user should select ***MAIN***. To exit out of MIPS the user should select ***QUIT***.

7.2 SUBMITTING ITEMS TO THE BULLETIN BOARD

The submit screen is a blank form requiring the user to fill in the title and text of the proposed bulletin board message. The screen allows the user to enter a title totaling 100 characters.

If a file already exists in ASCII, it can be downloaded directly to the bulletin board for submission, circumventing the need to retype the message. Additionally, messages may be entered using the VMS editor before being submitted for approval to Jeanne Behnke.

The user can select the ***DOWNLOAD*** option from the menu which will permit him to download the file using the desired communications package (i.e., VTERM, etc.). The user must prepare the file for being transmitted. The screen will blank and a message will appear at the top of the screen stating that the system is ready for download. The user should then use his package to send the message across the screen. After the last character is transferred, the user must type ***CTRL/Z*** to get out of the DownLoad mode. After downloading, the user is returned to the main bulletin board menu where he can make other selections.

If a user would like to enter a message directly with the assistance of the VMS editor, he can do so by selecting the ***USEEDITOR*** option. This sequence places the user within the editor and allows him to create and edit a message. Initially, the user is placed in linedit mode in the VMS editor. Upon completion, the user will type ***CTRL/Z*** to save the message and EXIT after the * prompt to submit it for approval. He will then be returned to the main bulletin board menu where he can make other selections. More information about the VMS editor is available in Section 2.5.4 and from the MIPS staff.

NOTE: Alternatively, the bulletin board items can be mailed directly to Jeanne Behnke for insertion by the MIPS staff into the ROSAT Bulletin Board. Users may mail messages to the following addresses:

SPAN:	ROSAT::BEHNKE
BITNET:	BEHNKE@ROSATBIT
INTERnet:	BEHNKE@ROSAT.GSFC.NASA.GOV

8. MIPSMAIL

During a MIPS session, the user may create output files of information he wishes to retain for future reference. For example, the user may find that output files of data concerning HRI technical specifications, the from the OBSTIME program, or catalog information from EXOSAT may be helpful. The ROSAT Mail System provides a convenient method for displaying a directory list of these files and for sending the files to a user's home location. Likewise, the user can create a message and then send it to his colleagues. A directory of the ROSAT MIPS users and their home network addresses is also available. A schematic diagram of the MIPS Mail System is shown in Figure 20.

The mail system uses the networks available to the ROSAT MicroVAX to send files and messages to MIPS users. These are DECnet-based SPAN (NSN), ARPAnet or INTERnet (using TCP/IP), and BITnet. Network access is described in Section 2.3 of this document and in the general online help for MIPS. The user should know to which networks his computer has access; this can be ascertained from the local system manager. Files can be sent via the same network used while logging onto MIPS. When phoning in from a personal computer (PC), the user cannot send files to the PC, but he can download the files after choosing the QUIT menu item (at the end of his session) from anywhere within MIPS. If the user experiences trouble obtaining his files after logging in, he should contact the MIPS staff.

Once the user has filled out the network information in the Guestbook, he can choose a menu item that will send the files back to his home site automatically. If the user does not fill out his network information when first signing onto MIPS, he may still receive files if his computer name and account name are known. Also, the user can enter or change the network information under the FIXADDRESS option. In general, most DEC VAX computers and astronomical institutions have access to NSN and most universities have access to INTERnet/ ARPAnet. The main MIPS mail system menu is shown in Figure 19.

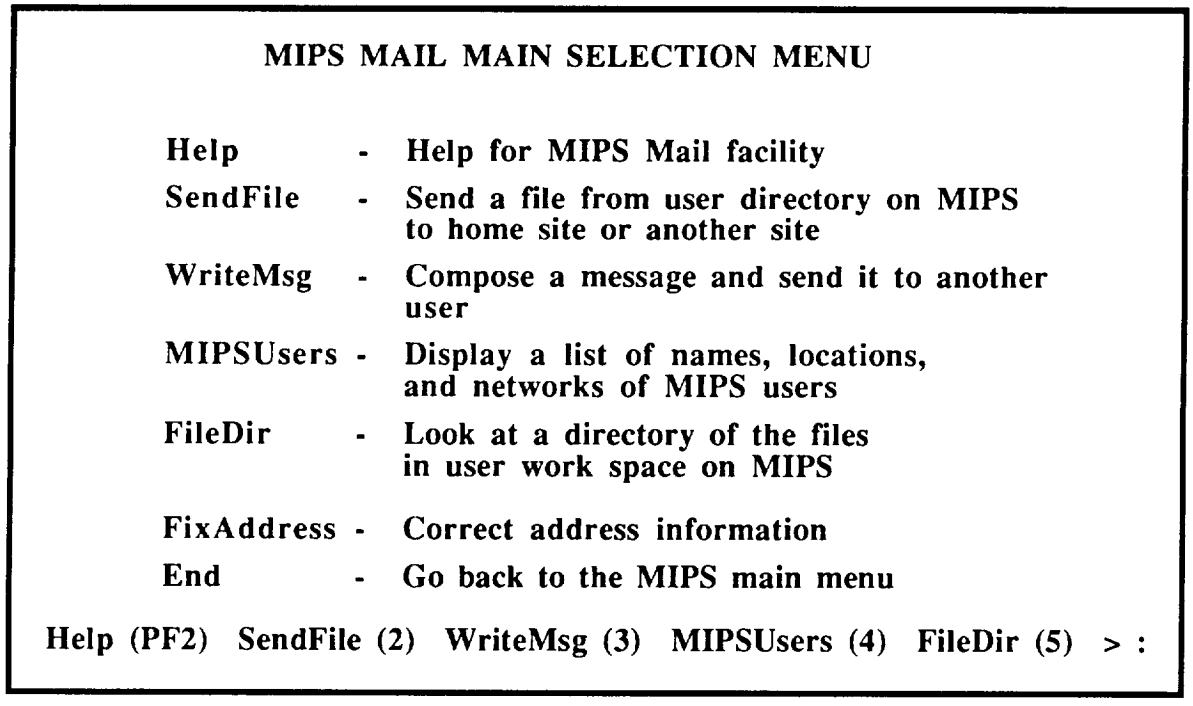

Figure 19. MIPS MAIL Main Menu

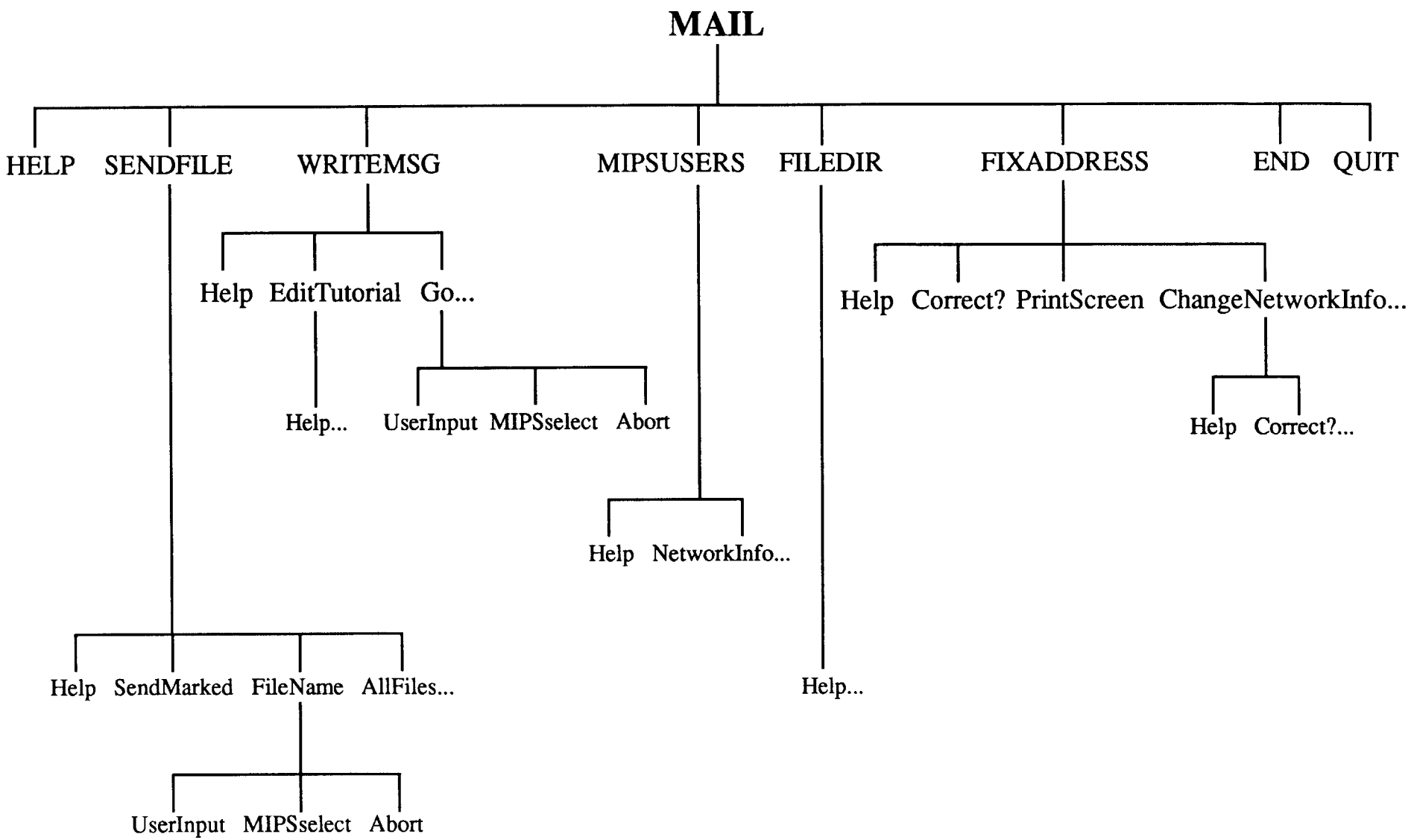

Figure 20. MIPSMAIL Menu Items

The four major menu items are discussed in more detail below:

SENDFILE -- During the course of a MIPS session, the user can create various data files from use of MIPS programs such as OBSTIME and TECSPEC. These files will reside in his MIPS work space and will be deleted unless he sends them back to himself before logging off of MIPS. The SENDFILE option of MAIL allows the user to send the files back to his home installation before logging off. The files are sent via one of the following networks: DECnet (SPAN), INTERnet or BITnet. The SENDFILE option lists the user's files and provides various options for choosing and sending those files. The user can send messages and files to a user at any node that has the above network connections, even if the recipient is not a MIPS user. In addition the user can choose the network. For the astronomer who does not know about networks, the MIPS mail system automatically sends the files back to his home installation, or to any other MIPS user designated by just typing in the person's last name. MIPS will find the user's computer node and account and pick the appropriate network automatically.

WRITEMSG -- This menu item places the user in the VAX EDT editor where he can compose a message to send to another user. An EDITTUTORIAL menu item is available in the WRITEMSG screen form for users unaccustomed to the VAX EDT editor. Users familiar with the editor can choose the GO menu item to go directly into the editor. After the message is written and the editor exited, the user is given the same options as are given for SENDFILE.

MIPSUSERS -- This menu item lists all users who have signed onto MIPS. The computer network address (node and account name) of a particular MIPS user can be obtained using this menu item, depending upon the particular user entering values in the MIPS Guestbook. This list is useful if the user desires full control over the networks being used by MIPS Mail. However, the computer address and network information is not necessary if the user allows MIPS to determine the path (which is one of the SEND options). This option should be used to check for the existence of a user in the MIPS table when using the automatic send, since the automatic MIPS send option relies upon this table for its address information. A FIND menu item is available for searching for a particular name of a user.

FILEDIR -- This menu item lists the user's files and is useful as a quick view of the files the user has created. This listing is repeated in the SENDFILE option for the convenience of the user. Extremely long filenames (greater than 29 characters) run the risk of being truncated. No more than 100 files will be displayed, since this is the maximum number of files a user can create during
a MIPS session.

FIXADDRESS -- FixAddress allows the users to correct their own address and network information. The first form displays the user's address information. If an item is incorrect, the user may change it by typing over it in the screen form and then selecting the Correct? menu item. The user may also print this screen to a file by selecting PrintScreen. Network information can be changed by selecting the ChangeNetworkInfo menu item. This will display a screen form of network information. Again, to correct an item, the user must type over it and then select Correct?.

8.1 SENDFILE

This option allows the user to select files for sending and to specify ways to send those files. The displayed form is the SELECT form (notice that SELECT is highlighted in the title of the form). When selecting the files to send, the SEND form is automatically called up and the user must choose a send option or abort the send. After a selection has been made, the user will be prompted to specify the method of transmission (see Section 8.1.2). Figure 21 illustrates the SENDFILE screen.

For a description of the networks used for sending files, users are directed to peruse the general, online help sections for MAIL and the general help for MIPS (Section 2).

8.1.1 SELECTing Files to Send

There are three ways to select files for sending. These various ways are implemented in order to give the user as much ease and flexibility in sending files as possible.

SENDMARKED -- The user marks the files to be sent on the list of files displayed on the screen and then selects the SENDMARKED menu item. The files marked are then sent to the designated address. If the cursor is on the menu item line (which it should be when the form first comes up), the user can simply press ***RETURN*** to mark the files. This action will place the cursor in the "marking" column of the file list (the column under the X) at the first file in the list. The user can mark the file to send with an X (or any other symbol). The box is to be left blank if the file is not to be sent. The user can mark as many files as desired. He should use the ***ARROW*** keys or the ***RETURN*** key for traversing down the list and ***CONTROL/P*** for moving back up the list (The help at the main menu and section 2.3, provide information on how to navigate within tables of screen forms). The user should press the ***FUNCTION*** or ***CONTROL*** keys for the NextPage, PrevPage, Top, and Bottom menu items to move to the next page, previous page, first file, or last file in the list. A box that has been previously marked can be blanked out by returning the cursor to that box and typing a space, deleting the mark, or hitting the RETURN key. After marking all the files to send, the user should execute the SENDMARKED menu item. The SEND screen form is displayed with the various ways to send the files. If the SENDMARKED menu item is executed with no files marked, instructions will appear in the INSTRUCTIONS table on the right side of the screen notifying the user to mark the files first and then execute SENDMARKED.

FILENAME -- With this option the user explicitly types in the names of the files to be sent. The user is prompted for the number of file names he wishes to type in. The user is then prompted one at a time for the name of each file to send. This option allows wildcards in the filenames and multiple file names to be entered. Thus, this option is best to use if the filename is known already or the user desires to use wildcards. An example follows showing the prompts and the user input after each prompt:

How many file names do you wish to type in (must be less than 100)? ***3***

Type in the filename (you can use wildcards): ***OBST10241.UPF***

Type in the filename (you can use wildcards): ***VIEW*.****

Type in the filename (you can use wildcards): ***MESSAGE%.TXT***

ROSAT - MIPS MAIL

SELECT FILES FROM MIPS WORK DIRECTORY TO SEND TO ANOTHER NODE:

X	LISTING OF FILES IN DIRECTORY	INSTRUCTIONS
X	OBST10101.UPF	(instructions pertaining to menu items are provided in this space)
	VIEW1010.UPF	

Help(PF2) SendMarked(2) FileName(3) AllFiles(4) PrevPage(5) >:

Figure 21. MIPS MAIL SENDFILES Screen Form

These responses will send OBST10241.UPF, all files starting with 'VIEW', and all files beginning with 'MESSAGE' and ending in '.TXT'. Note that by typing in 3 at the first prompt for the number of file names, the user is telling the program to prompt three times for three different file names. This does not necessarily mean that only three files will be sent! If wildcarding is done, many files could be sent. If a filename is not input, or if the filename is not in the user's MIPS workspace, then a non-fatal error message will be displayed. After all of the file names have been entered, the SEND screen form is displayed with the various ways for sending the files.

ALLFILES -- This option will send ALL the files in the user's MIPS workspace. The user should chose this option if all of the output products are to be sent back to the his home institution at the end of a session before logging out of MIPS. The number of files should be checked with the FILEDIR option of MAIL, or the user can check the file listing table to make sure there is not an excessively large number of files to send before using this option. The system may take a large amount of wall clock time to transmit many files. The user may have many miscellaneous files that are not wanted or needed. In this case, the FILENAME menu item can be used with wildcarding for quicker transmission.

8.1.2 SENDing the Files

This option allows the user to choose ways to send the files selected with the above menu items. There are two ways to send files or a message. These two ways are implemented to give the user as much flexibility in sending files as possible.

MIPSSELECT -- With this menu item, the user enters the last name of a MIPS user (a list of these users is obtained with the MIPSUSERS option). The MIPS mail facility will then look up the computer node, account, and the networks available and send the file automatically with no further user input, except for an optional subject text. This menu item also allows the user to send files or messages to himself by typing in an * at the prompt for a username. A subject text can be entered and will be attached to the mail message or file in the header part of the electronic mail system. This subject text can be used to identify the contents and should be short; a long statement may exceed the system buffer size of 60 characters and cause the send to abort. If this happens, the user should try to send again with a smaller subject text. INTERnet use does not prompt for a subject text since it uses the subject area for its own message.

USERINPUT -- With this menu item, the user must type in all of the information needed to send the file or message. These data include the computer node name, computer account, name of the recipient, and the network. The network will default to DECnet. This option has a few prompts, but it gives the user greater control over the network or computer node to which files or messages are sent. Note that the recipient of the message or files does not have to be a MIPS user with information in the MIPS tables for this option to work. This capability gives the user greater flexibility at the cost of more work on his part, but it might become crucial if the MIPS user chosen as a recipient has neglected to enter this information as part of his Guestbook entry. If the network is not one of INTERnet, BITnet, or DECnet (SPAN), the user will be prompted again for the network. The network will then default to DECnet (SPAN) if nothing is entered. The user can quit at any of the prompts by typing QUIT. As is the case with the MIPSSELECT option, the user can enter in a subject text (see above).

While the files are being sent across the network to the specified location, messages are generated on the screen indicating transmission. These messages should be watched to see if the files were

sent with no problems. Any messages are from the system and denote network or system difficulties. The MIPS Mail program can do nothing if the network or computer is down at the receiving site. In this event the files should be re-sent.

8.2 WRITEMSG

The WRITEMSG option will place the user into the VAX EDT editor to compose a message to send to another user. The user will then be given a choice of one of two options for sending the message. For users unaccustomed to the EDT editor, a tutorial screen will be shown if menu item EDITTUTORIAL is selected. After the message has been written and the user has exited from the editor, the SEND options will be displayed. After a message has been sent, the user has the option of saving the message for the remainder of his session. He then can send the message to other users by selecting the SENDFILE option. The SEND options are described below:

MIPSSELECT -- This menu item prompts the user to enter the last name of a MIPS user (a list of MIPS users can be obtained with the MIPSUSERS option). The MIPS mail facility then determines the connecting network, the computer node name, and the account name for the recipient user. The message is sent automatically with no further user input, except for an optional subject text. This option also allows a user to send mail to himself by typing an * at the **USERNAME** prompt.

A subject text is used to identify the contents of a message. If the user enters a subject text, it will be attached to the mail message in the header part of the electronic mail system. The subject text should be short; a long statement may exceed the system buffer size and cause the send to abort. If this happens, the user should try to send again with a smaller subject text. ARPAnet use does not prompt for a subject text since it uses the subject area for its own message.

After the message has been sent, the user will be prompted as to whether he wishes to save the message in a file. This capability allows usage of the SENDFILE option for sending the same message to another user. If the user responds affirmatively to the prompt, the message will be saved with filename MESSAGEn.TXT where n is a number between 1 and 9; otherwise the message will not be saved. If more than 9 messages are to be saved, the subsequent files are saved as higher versions of MESSAGE1.TXT. These files are only saved for the session, though, and are deleted when the user logs out of MIPS.

USERINPUT -- With this option, the user must type in all of the information needed to send the message to another user. This includes the recipient user's network, computer node name, and account name. This option gives the user greater control over the network and the computer node to which the message is being sent. Users should note that the recipient of the message does not have to be a MIPS user with information in the MIPS tables; however, it might become crucial if the MIPS recipient user has neglected to enter this information as part of his Guestbook entry.

If the network is not one of INTERnet, BITnet, or DECnet (SPAN), the user will be prompted again for the network; the network will default to DECnet (SPAN) if nothing is entered. The user can quit at any of the prompts by typing ***QUIT***.

As is the case with the MIPSSELECT option, the user can enter in a subject text and will be prompted as to whether he desires to save the message in a file.

While the message is being sent across the network to the specified installation, system and/or MIPS messages are generated on the screen indicating transmission. These messages should be watched to see if the user's message was sent with no problems. If a MIPS error message is received, it will have a number and be listed in Appendix D. Any other messages are from the system and denote network or system difficulties. The MIPS mail program can do nothing if the network or computer is down at the receiving site. In this event, the user's message should be re-sent.

Below is a step-by-step procedure detailing how to use this option of the mail system:

- To write a message and send it, the user chooses the menu item ***GO***.

- A message informs the user that he will be placed into the EDT editor. The user can ignore the message saying that the file does not exist; it will exist as soon as the user exits from the editor. To enter the screen mode of the editor, type ***C<CR>*** at the * prompt. Once in the editor, the user types his message and saves it by entering ***CONTROL/Z***, followed by ***EXIT*** at the * prompt. An EDT filename message passes by quickly when the user exits. Typing ***QUIT*** at the * prompt after ***CONTROL/Z*** will abort the execution of this option. The SEND selection menu will be displayed and the user will be prompted to select a SEND option.

- The user can send a message to himself or another user of MIPS by specifying any of the SEND options. The user also can send the message to a non-MIPS user if the network and computer address are known (obtainable with the MIPSUSER option in the main mail selection menu) by using the USERINPUT option.

- If the user wants to send the message using MIPSSELECT, he just types in the last name of the person to send to, as long as that person is in the MIPS tables (as shown with MIPSUSER in the main mail selection menu). The message can be sent to the user himself by typing * at the prompt. Alternatively, the USERINPUT option will prompt for account, computer node name, and network information for the person to send the message to.

- After sending a message or aborting, the user will be prompted to save the message in a file. The user should type ***YES*** (or just ***Y***) to save the message in a file under the name MESSAGE.TXTn, where n = 1 to 9.

- The user is returned to the WRITEMSG menu where he can write and send another message if desired.

8.3 MIPSUSERS

The MIPSUSERS option provides a listing of anyone who has signed onto the MIPS system along with their user ID number located in the far left column to the left of the user's name. The unique menu items for this form are explained in detail below (the menu items for scrolling are described in the main help for MIPS).

NETWORKINFO -- This menu item prompts the user to enter a ***MIPS user ID number***, which is the number to the left of the user name in the list of names on the screen. After entering this number and pressing ***RETURN***, the screen displays the computer node name, computer node number, computer account, and networks available for that particular user. The user must remember that only those people who have filled out the MIPS Guestbook information when first signing onto MIPS will be shown on this list. If computer addresses and networks were not supplied by the user

in the Guestbook, that information will be missing when the NETWORKINFO menu item is selected. Also, a user must be on the MIPSUSERS list and must supply a computer address and network information to receive a file or message automatically on MIPS.

FIND -- This menu item scrolls to a particular name on the MIPSUSERS list specified by the user. The user name to find should be entered at the prompt.

8.3.1 NetworkInfo

The NETWORKINFO menu item provides the computer node name, computer node number, computer account (user ID at the node), and networks available for all MIPS users. Since the MIPS microVAX has access to the DECnet (SPAN), INTERnet, and BITnet networks, only those are shown. The computer node name and number, and even the account name might be different for different networks. This information can be used with the USERINPUT option under the SENDFILE menu item. When using SENDFILE, enter the ***name of node*** at the first prompt, the ***user ID*** at the node at the second prompt, and the ***associated network*** at the third prompt. If the user discovers that his particular network information is incorrect, he can use the FIXADDRESS menu option to correct the information.

The user should note that the MIPSSELECT option under the SENDFILE menu item (MIPS selects the network information automatically without user input) will work only if the **name of node** and **user ID at node** fields are defined in the MIPSUSERS list. The MIPSSELECT option uses the information shown on this form, thus only the *last name* (from the MIPSUsers list) is required at the prompt.

Once again, the user must remember that only those people who have filled out the MIPS Guestbook information when first signing onto MIPS will be shown on this list. If computer addresses and networks were not supplied by the user in the Guestbook, that information will be missing when the NETWORKINFO menu item is selected. Also, a user must be on the MIPSUSERS list and must supply a computer address and network information to receive a file or message automatically on MIPS.

8.4 FIX ADDRESS

The ROSAT Address Information screen form allows the user to update his mailing address and network information in the MIPS database. The MIPS mailing list will be used to send any messages to the user, copies of the newsletter, the User's Guide, and allows the user to mail MIPS files to his home installation.

After selecting this menu item, the user will view his address information. The user should type over the incorrect information shown on the screen and then select ***Correct?***. If the information is accurate or after correcting the information the user can view his network information by selecting ***ChangeNetwork***. A new screen is displayed with the user's information about his network addresses on DECnet (SPAN), BITNET or INTERnet. As before the user should type over any inaccurate information and then select ***Correct?*** to save the changes. The user must select the ***Correct?*** menu item whenever changes are desired. The user can only correct information about his mailing addresses. At any time, the user can select the **End** menu item to return to the previous menu.

9. PROPOSAL ENTRY SOFTWARE

Many methods exist to the user for ease in submitting the ROSAT proposal forms. The forms are available from the staff in the Microsoft Word MacIntosh format, Microsoft Word IBM PC format and ASCII format. The "Word" format files are available on request from the staff. Floppies are available for mailing to users. The ASCII version is available electronically on request from the staff.

9.1 ROSAT PROPOSAL SOFTWARE

Software is provided to the user as an alternative online method of entering proposal information, instead of typing the necessary information onto the NRA proposal forms. After selecting ***LogAProposal*** from the Access main menu, the user is taken through a series of six screen forms. With this series of six screen forms, the user can enter the necessary information required in the NASA Research Announcement (NRA) proposal submission. **The proposal information is not stored in the database.** Anything that the user enters in the proposal screen forms must be written to files during the session. Then, the user has the option of mailing the files back to his home installation, downloading to a personal computer or printing them at the home installation. The screen forms do not correspond to the format of the NRA proposal forms but are designed to facilitate online data entry. When logging off of the ROSAT MicroVAX any proposal files the user created will be deleted. The actual NRA Proposal forms can be found in Appendix E. The sequence of entering a proposal is as follows:

- Verify the Investigator's (user's) address
- Enter the Proposal Title, Subject and Number of Targets
- Enter the CoInvestigators information.
- Enter the Abstract of the proposal.
- Enter each target and any constraints.

Following the complete entry of a proposal, a file is created which the user can mail back to his home installation (possibly using the MAIL Facility). If the user states that a file should be created, an online file is generated in a format specified by the NRA.

9.1.1 NRA Cover Page - PI Address Information

This information is generated when a user logs onto the MIPS for the first time. The user enters his address and network information into the ROSAT GUESTBOOK. This information is reprinted in this screen form. The user can change any information on this form, by typing over the inaccurate data and selecting the Correct? menu item.

The following menu items are found:

Correct? -- Allows the user to save the data changed on the screen form in the database.

PrintScreen -- Prints this screen form as shown to a file. The user must enter a file name.

EnterProposal -- Takes the user to the screen forms used for proposal entry.

END -- Returns to the previous menu.

QUIT -- Allows the user to logoff of the ROSAT MicroVAX.

9.1.2 NRA Cover Page - Proposal Information

The first screen of the proposal entry software requests the user to enter a proposal title, the number of targets, and a subject number according to the following criteria:

Title: is 120 characters. It provides general information on the proposal title (which should describe the goal of the proposed research in a concise manner.

Number of targets: an integer with a maximum of 50. This information is necessary for determining that the correct number of target forms has been submitted with the proposal. The program will iterate the target form for user entry based on this number.

Subject: Currently, there are ten subject categories as follows.The default for the category is **10** or **OTHER**. When a user enters a number in the category field, the corresponding subject appears in the subject field below on the screen form.

Categories: The categories for ROSAT proposals are as follows:

1 Normal Stars
2 White Dwarfs
3 Cataclysmic Variables
4 Neutrons stars, Black holes
5 Supernova Remnants
6 Normal Galaxies
7 AGN
8 Clusters of Galaxies
9 Diffuse X-ray Emissions
10 Other

The following menu items are available on the Proposal screen form:

Printscreen -- Prints this screen form as shown to a file. The user must enter a file name.

Category -- Gives the user access to the table of categories.

EnterAbstract -- Takes the user to the screen form where the Proposal Abstract is input.

9.1.3 NRA Cover Page - Proposal Abstract

The Proposal Abstract form allows the user to enter a brief abstract of the proposal. The proposal abstract is a separate entity from the proposal discussion of Scientific Justification. The Scientific Justification for the proposal should be sent separately. In accordance with the NRA, the abstract is limited to 800 characters or approximately 150 words. The user is presented with a single Proposal Abstract field box in reverse video. The user should enter the abstract text in the box continuously, as in a word processor. Within the box, the user should use ARROW keys to move around, being careful not to use the ENTER or RETURN key. The abstract should summarize the main scientific goals of the proposal and justify the need for pointed observations.

The following menu items are available on the Proposal Abstract screen form:

Printscreen -- Prints this screen form as shown to a file. The user must enter a file name.

EnterCoInvestigators -- Takes the user to the screen form where the CoInvestigators' names are input.

9.1.4 NRA General Form - Co-investigators Information

The CoInvestigator screen form allows the user to enter six co-investigators for the proposal. The user needs to enter the coinvestigator name, institute, and country. If there are no coinvestigators the user may continue on to the next proposal screen form.

The following menu items are available on the Coinvestigators screen form:

Printscreen -- Prints this screen form as shown to a file. The user must enter a file name.

EnterTarget -- Takes the user to the Target screen form where the user enters each target to be viewed by ROSAT.

9.1.5 NRA Target Form - Target Information

This screen form allows the user to enter information about proposal targets. This form is iterated based on the number of targets specified in the proposal screen. The target number of the proposal (i.e., Target 1, Target 2) appears in the top left corner of the screen. The user should enter the targets in priority order. If the user indicates that the target is time critical, then following the entry of the target, a new screen form will appear requesting constraint information. U.S. observers are allowed to suggest the operation of the Wide Field Camera. For complete information on ROSAT proposal entry, please review the NRA - Chapter 9. The information required by this form follows:

Target Name:	This field is used to identify the target.
Alternate Name:	An alternate target name can also be given.
Target Position:	Right Ascension and Declination must be specified in equinox 2000. The user should note that this position will be used for the actual pointing of the satellite. The precession program in TOOLS can be used to determine the epoch 2000 position.
Observation Time:	This field denotes the total requested observing time for the specified pointing direction in kiloseconds.
Number of Observations:	This field determines how many ROR's will be generated from the target form.
Additional Constraints:	Yes or No. This field indicates whether special scheduling constraints apply or not. If this entry is ***YES***, an observational constraint form must accompany the target form. A new screen form will be displayed when this entry is labelled YES.

Wide Field Camera Zoom Flag On:	Yes or No. This field requests a small or large WFC field of view.
Instrument Configuration:	Either the PSPC or the HRI as the primary. The WFC should always be considered secondary. The primary instrument is denoted by the entry ***1***, the secondary instrument by the entry ***2*** and the instrument not to be used by the entry ***0***.
PSPC Filter Sequence:	These fields specify the requested PSPC filter sequence when the PSPC is the primary or secondary instrument. The filter identifications are **OPEN** and **BORON** to indicate whether PSPC observations in the open position or with the boron filter. In case no filter change is requested, the user should specify the **OPEN** filter identification with percentage time set to 100 percent and minimum time set to zero.
WFC Filter Sequence:	These items specify the requested WFC filter sequence. **US observers may choose to suggest a WFC filter sequence, bu it cannot be guaranteed that the specified sequence will be scheduled.** The filter identification for the WFC is S1, S2, P1, P2 and OPQ to indicate filters of choice. If only a single filter is desired, the user should provide the appropriate filter identification with percentage time set to zero.
Remarks:	The remarks entry provides room for special remarks, note that it cannot be guaranteed that any requests in this field will be taken into account. This field is 200 characters in length.

The following menu items are available in the Target screen form:

Printscreen -- Prints this screen form as shown to a file. The user must enter a file name.

EnterTarget -- Saves the users entry and allows the user to continue entering target selections or to continue onto the constraints form.

END -- Allows user to quickly exit the system. WILL NOT SAVE ANY INFORMATION THE USER HAS ENTERED!

9.1.6 NRA Constraints Form - Constraint Information

This screen form appears only if the additional constraints field has been selected as **YES**. This screen form appears after the user has finished entering the specific target. A constraints form must be filled out for every target to which additional constraints apply. For different types of constraints are considered: coordinated observations, monitoring observations, phase dependent observations and contiguous observations. Note that only one type of observing constraint can be selected.

The following menu items are available in the Constraints screen form:

Printscreen -- Prints this screen form as shown to a file. The user must enter a file name.

EnterCoor -- Saves the users entry and allows the user to continue entering target selections

9.1.7 Change Proposal:

This screen form displays the cover page of the proposal as it was entered by the user. Appearing on the screen are the title of the proposal, number of targets, category, and abstract. The user is allowed to change the title, the category number and the abstract of the proposal. To change the information, type over the text on the screen form. Then the user should select the ChangeProposal menu item to save the changes. The user also has the option of adding an additional target to his proposal by selecting the AddTARGET menu item. Finally, when the proposal information has been entered to satisfaction, the user should select the END option to save the proposal text in an ASCII data file. The proposal file will stay in the user's temporary MIPS workspace until the user logs off of the ROSAT MicroVAX. The user can send the proposal file back to his home institution through the MIPS MAIL facility. The proposal file conforms to the ROSAT NRA standard. The file is named

PROPxxxx.OUT

where the xxxx is a unique number associated with each user.

CAUTION! THE ASCII PROPOSAL FILE DOES NOT REMAIN IN THE SYSTEM. ANY INFORMATION ENTERED IN THE PROPOSAL SUBSYSTEM IS DELETED WHEN THE USER LOGS OFF.

The following menu items are available in this screen:

Printscreen -- Allows the user to print the contents of the screenform

ChangeProposal -- Allows the user to make changes to the information appearing on the screen about the proposal

ChangeTarget -- Allows the user to change the information entered about a target. The program will request the user to enter a target number. Following this, the user is shown the particular target information including any constraints on that target.

AddTarget -- Allows the user to add an additional target and target constraints to his proposal.

END -- exits the user from the proposal subsystem creating an ASCII data file on the way out.

10. COMMAND MODE

Command mode provides the experienced MIPS user a quick way to access certain programs of MIPS. Access to command mode is available after the user has typed in his MIPS username and password. MIPS prompts the user for Menu Mode or Command Mode. Later on during a session if the user decides that command mode is preferable, the user need only to select the ***Quit*** (PF4) menu option. The user is then prompted **"Do you want to logoff the MicroVAX? [Y/N]"**. The user should respond '***N***'o after which they will be placed into their MIPS workspace and the operating system prompt MIPS> appears. No menus are provided to the user in command mode. Instead the user is prompted for the information necessary to execute a specific function. At the **MIPS>** prompt, the user may enter any one of the following commands: BBOARD, CATALOG, ECLTRANS, MISSION, OBSTIME, PRECESS, PSPCEXP, or VIEWING. For further online information on a command the user can type 'HELP xxx' where xxx is the name of the command. The system then displays information on that command.

10.1 BBOARD - Bulletin Board

After the user enters the ***BBOARD*** command, a list of the bulletin board items is displayed. The user is then prompted to enter ***D*** to display a bulletin board item, ***P*** to print a bulletin board item, or ***Q*** to Quit. If **D** is selected, the user is prompted for an item number. This Bulletin Board item is then displayed a page at a time. The user must use the return key to page through the item. After the last page of the bulletin board item has been displayed, the list of items is redisplayed. If **P** is selected, the user is prompted for the item number and file name in which to print the item. After the item has been printed to a file, the list of bulletin board items is redisplayed. For more information on the Bulletin Board see Section 7.

10.2 CATALOG - Catalog Access

The catalog command provides users access to the data catalogs of related misisons, EINSTEIN and EXOSAT, stored in the MIPS database. After entering the ***CATALOG*** command, the user is prompted for which catalog to search. The user must enter ***S*** to search the IPC Source catalog, ***F*** to search the IPC Field catalog, ***E*** to search the Einstein catalog, or ***X*** to search the Exosat catalog.

If **S** or **F** is selected, the user is prompted for the epoch (either 1950 or 2000), Right Ascension, Declination, and radius of the search to be performed. The sources or fields are displayed in table format. The user is then prompted to enter ***S*** to show a full display of a source, ***F*** to show a full display of a field, or ***Q*** to Quit. If the user selects **S** or **F**, he is prompted for the specific sequence number and field number when appropriate. The information on the specific sequence or field is displayed and the user is requested to press the return key to continue. The table of sources or fields is then redisplayed.

If **E** is selected, the user is prompted for the Right Ascension, Declination, and radius of the search. A table of information about the EINSTEIN Catalog sequences is displayed followed by a prompt to enter ***F*** to show a full display or ***Q*** to Quit. If the user enters **F**, he is prompted for the specific sequence number. The information on the specific sequence numberis displayed and the user is requested to press the return key to continue. The table of EINSTEIN Catalog sequences is then redisplayed.

If **X** is selected, the user is prompted for the Right Ascension, Declination, and radius of the search on the EXOSAT Catalog. A table of EXOSAT sequence information is displayed followed by a prompt to enter ***Q*** to Quit.

For more information on Catalog Access see Section 4.

10.3 ECLTRANS - Ecliptic Transformation

The ECLTRANS program was written to provide users a way to translate right ascension and declinaton positions into Ecliptic Coordinates. After entering the ***ECLTRANS*** command at the MIPS> prompt, the user is first prompted for the epoch of position (either 1950 or 2000). The user then must enter either ***R*** to convert Right Ascension and Declination to Ecliptic coordinates or ***E*** to convert Ecliptic coordinates to Right Ascension and Declination. If the user selects ***R***, he is prompted for the Right Ascension and Declination. If the user selects ***E***, he is prompted for the Ecliptic Latitude and Ecliptic Longitude. The transformed coordinates are then displayed. For more information on Ecliptic Tranformation see Section 6.5.

10.4 MISSION - Mission Information

The MISSION program provides users access to ROSAT mission information such as the mission timeline and approved proposals. After entering the ***MISSION*** command, the user is first prompted for the type of information he wishes to see. The user should enter ***P*** for proposal information, ***I*** for investigator information, ***M*** for mission timeline, ***N*** for target name search, ***C*** for target location search, ***D*** to display information for a particular target, or ***W*** for WFC Investigator information.

If the user selects **P**, he is prompted for the proposal number or to press the return key to enter the proposal title.

- If the user enters a proposal number, the information is displayed and the user is prompted to enter ***D*** to Display target information or ***Q*** to Quit out of the program. If the user selects **D**, all of the approved targets for this proposal are displayed a page at a time. The user may press the return key after each page is displayed to see the next target or select **Q** to Quit. After all targets are displayed the program automatically ends.

- To search by proposal title, the user can enter the complete title of a proposal or as much as the user desires in a pattern search. All searches are performed with a wild card character'*' appended to the end of the query. A wild card is a special character, which can be substituted for other individual characters and/or character strings. For MIPS, the wild card character can be entered before any alphanumeric information. All proposals which have titles that contain the pattern are displayed in a table of the following information: the proposal number, the investigator's name, the category of the proposal, and the title.

If the user selects **I**, then he is prompted for the investigator's last name and first name (or initial). The user does not need to enter a first name if there is only one investigator with a particular last name. The user only needs to enter as much of the last (and first) name as is required to make it unique. If the name specified is not unique then an error message is displayed. Otherwise the investigator information is displayed followed by a prompt to enter ***P*** to display proposal information or ***Q*** to Quit. If the user selects **P**, each proposal is displayed a page at a time. The user may type ***Q*** at any time to quit out of the program.

If the user selects **M**, he is prompted to enter ***P*** to do a proposal search, ***D*** for a date search, or ***I*** for an investigator search.

- If the user selects **P**, he is prompted for a proposal number. The mission timeline for this proposal number is then displayed followed by a prompt to enter ***D*** to display target information or ***Q*** to Quit. If the user selects **D**, all of the approved targets for this proposal are displayed a page at a time. The user may press the return key after each page is displayed to see the next target or select ***Q*** to Quit. After all targets are displayed the program automatically ends.

- If the user selects **D**, he is prompted for a date. The mission timeline for this date is then displayed followed by a prompt to enter ***D*** to display target information or ***Q*** to quit. If the user selects **D**, he is prompted for the proposal number and target number. The user may hit the return key instead of entering a target number in order to display all targets. The target(s) are then displayed as above.

- If the user selects **I**, he is prompted for the last and first name of the investigator. The user only needs to enter as much of the last and first name as is required to make it unique. The mission timeline for this investigator is displayed followed by a prompt to enter ***D*** to display target information or ***Q*** to quit as above.

If the user selects **N**, he is prompted for the name of the target. The wild card character may be used. A table of information displays all targets that match the string entered by the user. The user is then prompted to enter ***D*** to display complete target information or ***Q*** to quit as above.

If the user selects **C**, he is prompted for the epoch, Right Ascension, Declination, and radius of the search. A table displays all targets that are within that cone. The user is then prompted to enter ***D*** to display complete target information or ***Q*** to quit as above.

If the user selects **D**, he is prompted for the proposal number and target number. The user may hit the return key instead of entering a target number in order to display all targets. The target(s) are then displayed as above.

If the user selects **W**, the list of WFC Investigators is displayed in ascending proposal number order. The user may hit the return key to page through the list or may type ***Q*** to Quit at any time.

For more information see Section 5.

10.5 OBSTIME - Observation Time

For more information on Observation Time see Section 6.2.

10.6 PRECESS - Precession

MIPS offers to users a program that precesses coordinates from one epoch to another. Users should remember that ROSAT proposal coordinates must be entered in EPOCH 2000 coordinates. After entering the **PRECESS** command, the user is first prompted for the epoch of the original target position and then the epoch for the desired target. Both epochs must be between 1950.0 and 2000.0. The user is then prompted for the Right

Ascension and Declination. The new coordinates are then displayed for the desired epoch. For more information on Precession see Section 6.4.

10.7 PSPCEXP - PSPC Survey Exposure Time

MIPS contains a list of the PSPC survey exposure times at various ecliptic coordinates. This information is important to investigators who wish to propose for PSPC exposures. Proposals must be for at least twice the survey exposure time. After entering the ***PSPCEXP*** command, the user is prompted for the ecliptic latitude in degrees. Within the range of -89.5 to +89.5. The information displayed contains a list of twice the PSPC survey exposure time (in seconds) at a specified ecliptic latitude. For more information on PSPC Exposure Time see Section 6.6.

10.8 VIEW - Viewing Windows

The VIEW program allows users to calculate viewing windows for their targets. After entering the ***VIEW*** command, the user is prompted for the start date and end date for the viewing window. These must be between 1988 and 1993. The user is prompted for the Right Ascension, Declination, and epoch of the target. The user is asked if he would like to check for coincidences and if so the radius of the coincidence circle in degrees. The user may enter an optional target name. The viewing windows are then calculated and displayed and the user is prompted if he would like to run VIEWING again. For more information on Viewing Windows see Section 6.1.

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APPENDIX A

ACRONYMS

ASCII	American Standard Code for Information Interchange
AXAF	Advanced X-ray Astrophysical Facility
BMFT	Bundes Ministerium Forschung und Technologie
CR	Carriage Return
DBMS	Database Management System
DDAC	Distributed Data Analysis Center
DEC	Digital Equipment Corporation
DLR	Deutsche Forschungs Anstalt fuer Luft und Raumfahrt
EO	EINSTEIN Observatory
EUV	Extreme Ultraviolet
FOV	Field of View
FWHM	Full Width Half Maximum
GOS	Guest Observer Support
GSFC	Goddard Space Flight Center
HRI	High Resolution Imager
LACN	Local Area Computer Network
MCP	Micro Channel Plate
MIPS	Mission Information and Planning System
modem	Modulator Demodulator
MPE	Max Planck Institute for Extraterrestrial Physics
NASA	National Aeronautics and Space Administration
NRA	NASA Research Announcement
NSN	NASA Science Network

ACRONYMS
(continued)

NSSDC	National Space Science Data Center
PC	Personal Computer
PRF	Point Response Function
PSPC	Position Sensitive Proportional Counter
ROR	ROSAT Observation Requests
ROSAT	Roentgen Satellite
SAO	Smithsonian Astrophysical Observatory
SPAN	Space Physics Analysis Network
TBD	To Be Determined
TCP/IP	Transmission Control Protocol/INTERnet Protocol
UK	United Kingdom of Great Britain
USA	United States of America
USRSDC	United States ROSAT Science Data Center
UV	Ultraviolet
WFC	Wide Field Camera
XRT	X-ray Telescope

APPENDIX B

LOCAL AREA ACCESS NUMBERS FOR TELENET

State	Area Code	City	300/1200 Baud	2400 Baud	9600 V.29	9600 V.32
AK	907	Anchorage	276-0453	276-0453		
	907	Fairbanks	456-3282	--		
	907	Kodiak	486-4061	--		
	907	Nome	443-2256	--		
AL	205	Birmingham	328-2310	251-1885		
	205	Huntsville	539-2281	539-1631		
	205	Montgomery	269-0090	832-4314		
AR	501	Little Rock	372-4616	374-2861		
AZ	602	Phoenix	254-0244	256-6955	254-0040	254-1903
	602	Tuscon	747-0107	747-9395		
CA	818	Glendale	507-0909	246-3886		
	213	Los Angeles	937-3580	622-1138	937-0233	937-5526
	213	Los Angeles	624-2251	622-1138	937-0233	937-5526
	213	Marina Del Rey	306-2984	306-4922		
	415	Oakland	836-4911	834-3194		
	916	Sacramento	448-6262	443-7434		
	619	San Diego	233-0233	231-1703		
	415	San Francisco	956-5777	788-0825	956-6317	956-2256
	805	Santa Barbara	682-5361	564-1158		
CO	303	Denver	337-6060	696-0159	337-3304	745-3285
CT	203	Hartford	247-9479	724-9396		
	203	New Haven	624-5954	773-3569		
DC	202	Washington	429-7800	429-0956	429-9145	659-2733
	202	Washington	429-7896	429-0956	429-9145	659-2733
DE	302	Dover	678-8328	--		
	302	Newark	454-7710	737-4340		
FL	904	Jacksonville	353-1818	791-9201		
	305	Miami	372-0230	372-1355	372-9684	358-5349
	407	Orlando	422-4088	422-8858		
	813	Tampa	224-9920	223-5859		
GA	404	Atlanta	523-0834	584-0212	523-5512	688-1212
	912	Savannah	236-2605	236-2875		
HI	808	Oahu	528-0200	528-0200		
	808	Other islands	272-5299	272-5299		
IA	515	Des Moines	288-4403	288-6206		
ID	208	Boise	343-0611	343-1272		
IL	312	Chicago	938-0600	938-8725	938-4401	938-5462
IN	317	Indianapolis	299-0024	299-6766		
KS	913	Topeka	233-9880	233-4660		
KY	502	Louisville	589-5580	583-1006		
LA	504	New Orleans	524-4094	522-3967	524-7337	524-7442
MA	617	Boston	292-0662	574-9244	292-9522	338-0002
	508	Woods Hole	540-7500	457-9390		
MD	301	Frederick	293-9596	--		
	301	Baltimore	727-6060	752-5555	727-2044	

LOCAL AREA ACCESS NUMBERS FOR TELENET

(continued)

State	Area Code	City	300/1200 Baud	2400 Baud	9600 V.29	9600 V.32
	301	Annapolis	224-8550	224-0795		
ME	207	Augusta	622-3123	622-7364		
	207	Portland	761-4000	--		
MI	313	Ann Arbor	996-5995	665-2900	996-0035	
	313	Detroit	964-2988	963-2274	964-3133	965-3011
	616	Grand Rapids	774-0966	774-0131		
MN	612	Minneapolis	341-2459	338-1661	341-0324	332-0033
MO	314	St. Louis	421-4990	421-0381	421-0872	421-1376
MS	601	Jackson	969-0036	969-0152		
MT	406	Helena	443-0000	443-0527		
NC	704	Charlotte	332-3131	333-6204	332-3705	332-4023
	919	Greensboro	273-2851	275-1251		
	919	Raleigh	834-8254	834-8254		
ND	701	Fargo	235-7717	235-9069		
NE	402	Lincoln	475-4964	475-3839		
	402	Omaha	341-7733	346-6419		
NH	603	Concord	224-1024	225-8710		
NJ	201	Newark	623-0469	623-7122	623-0900	624-8843
	609	Princeton	799-5587	936-0231	799-0244	
	609	Trenton	989-8847	989-7127		
NM	505	Albuquerque	243-4479	242-1742		
NV	702	Las Vegas	737-6861	737-5466		
	702	Reno	827-6900	827-5290		
NY	518	Albany	465-8444	465-8632		
	716	Buffalo	847-1440	847-1825		
	212	New York	741-8100	645-0560	633-1117	206-0256
	212	New York	620-6000	645-0560	633-1117	206-0256
	212	New York	741-4950	645-0560	633-1117	206-0256
	315	Syracuse	472-5583	479-5445		
OH	513	Cincinnati	579-0390	241-8008	579-1583	579-1593
	614	Columbus	463-9340	461-9044	463-9110	461-8671
	513	Dayton	461-5254	461-0755		
	419	Toledo	255-7881	255-1906		
OK	405	Oklahoma City	232-4546	232-9513		
	918	Tulsa	584-3247	587-2774		
OR	503	Portland	295-3028	241-0496	295-2936	295-0337
PA	814	Erie	899-2241	453-3793		
	717	Harrisburg	236-6882	236-2007		
	215	Philadelphia	574-9462	574-0990	574-0094	629-1172
	412	Pittsburgh	288-9950	471-6430	281-8782	281-8326
	412	Pittsburgh	288-9974	471-6430	281-8782	281-8326
RI	401	Providence	751-7912	831-3990		
SC	803	Charleston	722-4303	577-4710		
SD	605	Sioux Falls	336-8593	336-6438		
TN	901	Memphis	521-0215	527-5175		
	615	Nashville	244-3702	255-2608		
TX	512	Austin	928-1130	929-3622		

LOCAL AREA ACCESS NUMBERS FOR TELENET

(continued)

State	Area Code	City	300/1200 Baud	2400 Baud	9600 V.29	9600 V.32
	214	Dallas	748-6371	745-1359	748-3541	653-0840
	817	Fort Worth	332-4307	332-6794	332-8424	
	713	Houston	227-1018	227-8208	227-1760	228-0705
UT	801	Salt Lake City	359-0149	359-0578		
VA	804	Charlottesville	977-5330	--		
	703	Herndon	435-1800	481-6807		
	804	Norfolk	625-1186	625-2408		
	804	Richmond	788-9902	343-4140		
VT	802	Burlington	864-0808	--		
WA	206	Seattle	625-9612	623-9951	625-9008	625-0860
WI	414	Green Bay	432-2815	432-0346		
	608	Madison	257-5010	257-8472		
	414	Milwaukee	271-3914	278-8007	271-2238	271-2420
WV	304	Charleston	345-6471	345-7140		
	304	Morgantown	292-0104	292-0492		
WY	307	Casper	265-5167	265-8807		

APPENDIX C

TERMINAL NAMES FOR INGRES

No.	Terminal Type	Menu Key	Name
1	ADDRINFO	ESC	addrinfo
2	ADDS CONSUL 980	ESC	a980
3	ADDS REGENT 100	ESC	regent100
4	ADDS REGENT 20	ESC	regent20
5	ADDS REGENT 25	ESC	regent25
6	ADDS REGENT 40	ESC	regent40
7	ADDS REGENT 60	ESC	regent60
8	REGENT 60 w/no arrow keys	ESC	regent60na
9	ADDS REGENT SERIES	ESC	regent
10	AMPEX DIALOGUE 80	ESC	ampex
11	ANN ARBOR	ESC	aa
12	ANN ARBOR AMBASSADOR 48 /destructive backspace	ESC	aadb
13	ANN ARBOR AMBASSADOR/ 48 lines	ESC	aaa
14	BEEHIVE SUPER BEE	ESC	sb1
15	FIXED SUPERBEE	ESC	sb2
16	BEEHIVE lllm	ESC	bh3m
17	CONCEPT 100	ESC	c100
18	CONCEPT 100 slow	ESC	c100s
19	CONCEPT 100 slow reverse video	ESC	c100rvs
20	C100 reverse video	ESC	c100rv
21	C100 with 4 pages	ESC	c1004p
22	C100 reverse video with 4 pages	ESC	c100rv4p
23	C100 with no arrows	ESC	c100rv4pna
24	C100 with printer port	ESC	c100rv4ppp
25	CDC	ESC	cdc456
26	CDC456tst	ESC	cdc456tst
27	CDI1203	ESC	cdi
28	COMPUCOLORII	ESC	compucolor
29	CYBERNEX mdl-110	ESC	mdl110
30	DATA GENERAL 6053	ESC	dg
31	DATAMEDIA 1520	ESC	dm1520
32	DATAMEDIA 1521	ESC	dm1521
33	DATAMEDIA 2500	ESC	dm2500
34	DATAMEDIA 3025a	ESC	dm3025
35	DATAMEDIA 3045a	ESC	3045
36	DATAMEDIA dt80/1	ESC	dt80
37	DATAMEDIA dt80/1 in 132 char mode	ESC	dt80132
38	DATAPOINT 3360	ESC	datapoint
39	DEC VT100 w/function keys activated	PF1	vt100f

TERMINAL NAMES FOR INGRES
(continued)

No.	Terminal Type	Menu Key	Name
40	DEC VT100 w/function keys activated (3.0 version)	PF1	vt100k
41	DEC VT100 w/numeric keypad	PF1	vt100nk
42	DEC VT100 w/out function keys activated	ESC	vt100
43	DEC VT100 in 132 column mode w/ function keys activated	PF1	vt100fw
44	DEC VT100 in 132 column mode w/ function keys activated (3.0 version)	PF1	vt100kw
45	DEC VT100 in 132 column mode w/ numeric keypad	PF1	vt100nkw
46	DEC VT100 in 132 column mode w/out function keys activated	PF1	vt100w
47	DEC VT100 w/giant characters	ESC	vt100g
48	DEC VT100 w/no initialization	ESC	vt100n
49	DEC VT125	ESC	vt125
50	DEC VT220	PF1	vt220
51	DEC VT241 w/color	PF1	vt241
52	DEC VT50	ESC	vt50
53	DEC VT50h	ESC	vt50h
54	DEC VT52	ESC	vt52
55	DEC VT132	ESC	vt132
56	DELTA DATA 5000	ESC	delta
57	DIGILOG 333	ESC	digilog
58	ENVISION	PF1	envision
59	ENVISION w/color	PF1	envisionc
60	GENERAL TERMINAL 100A (formerly INFOTON 100)	ESC	i100
61	HAZELTINE 1500	ESC	h1500
62	HAZELTINE 1510	ESC	h1510
63	HAZELTINE 1520	ESC	h1520
64	HAZELTINE 1552	ESC	h1552
65	HAZELTINE 1552 reverse video	ESC	h1552rv
66	HAZELTINE 2000	ESC	h2000
67	HEATHKIT h19	ESC	h19
68	HEATHKIT h19 ansi mode	ESC	h19A
69	HEATHKIT w/keypad shifted	ESC	h19bs
70	HEATHKIT w/keypad shifted/ underscore cursor	ESC	h19us
71	HEATHKIT w/underscore cursor	ESC	h19u
72	HEWLETT PACKARD 2621	ESC	2621
73	HEWLETT PACKARD 2621 w/45 keyboard	ESC	2621k45

TERMINAL NAMES FOR INGRES
(continued)

No.	Terminal Type	Menu Key	Name
74	HEWLETT PACKARD 2621 w/labels	ESC	2621wl
75	HEWLETT PACKARD 2621 w/no labels	ESC	2621nl
76	HEWLETT PACKARD 2621 48 lines	ESC	big2621
77	HEWLETT PACKARD 2626	ESC	hp2626
78	HEWLETT PACKARD 2640a	ESC	2640
79	HEWLETT PACKARD 2648a graphics terminal	ESC	hp2648
80	HEWLETT PACKARD 264x series	ESC	2640b
81	HEWLETT PACKARD 264x series	ESC	hp
82	IBM 3101-10	ESC	ibm
83	INFOTON 400	ESC	i400
84	INFOTON KAS	ESC	infotonKAS
85	ISC modified owl 1200	ESC	intext
86	ISC8001	ESC	8001
87	LSI adm2	ESC	adm2
88	LSI adm3	ESC	adm3
89	LSI adm3a+	ESC	adm3a+
90	LSI adm31	ESC	adm31
91	LSI adm3a	ESC	adm3a
92	LSI adm42	ESC	adm42
93	MICRO BEE SERIES	ESC	microb
94	MICROTERM ACT IV	ESC	microterm
95	MICROTERM ACT V	ESC	microterm5
96	MICROTERM MIME1	ESC	mime
97	FULL BRIGHT MIME1	ESC	mimefb
98	HALF BRIGHT MIME1	ESC	mimehb
99	MICROTERM MIME2A (emulating an enhanced SOROC iq120)	ESC	mime2as
100	MICROTERM MIME2A (emulating an enhanced VT52)	ESC	mime2a
101	MIME1 emulating 3A	ESC	mime3a
102	MIME1 emulating enhanced 3A	ESC	mime3ax
103	NETRONICS	ESC	netx
104	PERKIN ELMER 1100	ESC	fox
105	PERKIN ELMER 1200	ESC	owl
106	SOL	ESC	sol
107	SOROC 120	ESC	soroc

TERMINAL NAMES FOR INGRES
(continued)

No.	Terminal Type	Menu Key	Name
108	SOUTHWEST TECHNICAL PRODUCTS CT82	ESC	swtp
109	SUPER BEE w/insert characte	ESC	superbeeic
110	TEKTRONIX 4105	PF1	tk4105
111	TEKTRONIX 4105 w/color	PF1	tk4105c
112	TELERAY 1061	ESC	t1061
113	TELERAY 1061 w/fast PROMs	ESC	t1061f
114	DUMB TELERAY 3700	ESC	t3700
115	TELERAY 3800 series	ESC	t3800
116	TELETEC DATASCREEN	ESC	teletec
117	NEW TELEVIDEO 912	ESC	912b
118	NEW TELEVIDEO 920	ESC	920b
119	OLD TELEVIDEO 912	ESC	tvi912
120	OLD TELEVIDEO 920	ESC	tvi920
121	VISUAL 200 no function keys	ESC	vi200f
122	VISUAL 200 reverse video	ESC	vi200rv
123	VISUAL 200 reverse video using insert character	ESC	vi200rvic
124	VISUAL 200 using insert character	ESC	vi200ic
125	VISUAL 200 w/function keys	ESC	vi200
126	XEROX 1720	ESC	x1720
127	XITEX sct-100	ESC	xitex
128	ZENTEC 30	ESC	zen30

APPENDIX D

ERROR NUMBER DEFINITIONS

Error No.	Description
1001	While IC=LX, BIE or LX is out of range, i.e. <0
1002	While IC=LM, LM or EE is out of range, i.e. <0
1003	While IC=FX, FX or BIO is out of range, i.e. <0
1004	While IC=SX, SX or EO is out of range, i.e. <0
1005	While ST=EG,RS, or BB, KT or T is out of range
1006	If DC (distance code)=DZ, D must be > 0
1007	If DC (distance code)=HQZ, Z and H must be > 0
1008	If DC(dist. code)=DHQ, D and H must be > 0
1009	If OC (output code)=TIM, then EXPTIM must be > 0
1010	If OC(output code)=SN, SN must be > 0
5001	LX - is out of range 0<LX<=1.0E60
5002	LM - is out of range 0<LM<=1.E38
5003	D - is out of range 0<D<=1.E15
5004	Z - is out of range 0<=Z<=15.0
5005	H - is out of range 0<H<=500.0
5006	Q - is out of range 0<=Q<=100.0
5007	FX - is out of range FX>1.0E-38
5008	SX - is out of range SX must be >0
5009	EO - is out of range .02<=EO<10.0
5010	ALPHA - is out of range -1.0<=ALPHA<=5.0
5011	KT - is out of range 0.01<=KT<=17.0
5012	NHS - is out of range 0<=NHS<=1.0E30
5013	NHG - is out of range 0<=NHG<=1.0E30
5014	EXPTIM - is out of range 0<EXPTIM<=1000.0
5015	SN - is out of range 0<SN
5016	T - is out of range 0.1<=T<=199.0
5017	IC - is not a valid string of LX, LM, FX, or SX
5018	DC - is not a valid string of DZ, HQZ or DHQ
5019	OC - is not a valid string of SN or TIM
5020	BIO(1) - is out of range .02<=BIO(1)<BIO(2)<10.0
5021	BIO(2) - is out of range .02<=BIO(1)<BIO(2)<10.0
5022	BIE(1) - is out of range .02<=BIE(1)<BIE(2)<10.0
5023	BIE(2) - is out of range .02<=BIE(1)<BIE(2)<10.0
5024	BO - Output bands are out of range 0.2<=BO<=2.5
5025	BO - Output bands are out of sequence
5026	BO - Output bands must be in pairs
5027	EXBG - are out of range 0<=EXBG<=10000.0
5028	EXBG - must have one for each output band
5029	EXBG - IN ERROR
5030	ST - is not a valid string of PL, EG, RS or BB
5031	FPD - is not a valid string of PSPC or HRI
5032	FIL - is not a valid string of Y or N
5033	PSPC_RAD - Radius for PSPC out of range 2.0<=RAD<=90.0
5034	HRI_RAD - Radius for HRI out of range 0.5<=RAD<=10.0
5035	EE - is out of range .02<=EE<10.0

ERROR NUMBER DEFINITIONS
(continued)

Error No.	Description
5036	RAD - is out of range, 0.5<=RAD<=90.0
5037	LM or SX options not allowed for Raymond-Smith spectrum
5038	For Raymond-Smith spectra, Z<=3.0
5039	SX - is out of range: SX must be > 1.0E-38.
5040	BIE - BIE(1) must be less than BIE(2)
5041	BIO - BIO(1) must be less than BIO(2)
5042	PSPC_RAD - Radius for PSPC must be an even number
6000	Unable to convert a variable, please check values
6001	Problems opening temporary file
6003	Please left justify the value. Be sure to enter a value.
6004	Please use a comma to separate values. Do not include spaces.
6005	Please enter real numbers with decimal points
6006	A blank field is not acceptable to the program
7000	(WARNING): A filename was too long and was truncated.
7010	DCL error:LIB$FREE_VM called with invalid virtual storage address.
7020	DEC library routine LIB$FIND_FILE contains a fatal error.
7030	Insufficient virtual memory at this time to do the listing.
7040	Available memory was exhausted during a VAX RMS operation.
7050	A read error occurred on a file header; a file may be corrupted.
7060	Internal software error in VAX Runtime Management System.
7070	Cannot display more than 100 files.
7080	Unspecified DEC DCL Runtime Management System error.
7090	Error in deleting scratch file containing directory listing.
8000	Input must be an integer in the range of 0 to 9999.
8020	Number of files must be between 0 and 100.
8030	Input must be an integer between 0 and 100.
8050	The user name entered is not in the MIPS tables.

APPENDIX E

Proposal for ROSAT Observations
Cover Page

Principal Investigator		
Title First name Middle name Last name		
Department		
Institute		
Address / Street		City / Town
State / County	Zip / Postal Code	Country
Telephone	Telex	Fax

E-mail Address Network Name	Network Address

Proposal Title		
Subject Category		
[ ] normal stars (1)	[ ] supernova remnants (5)	[ ] clusters of galaxies (8)
[ ] white dwarfs (2)	[ ] normal galaxies (6)	[ ] diffuse X-ray emiss. (9)
[ ] cataclysmic variables (3)	[ ] AGN (7)	[ ] other (10)
[ ] neutron stars, black holes (4)		
Number of Targets		

Abstract (800 characters maximum including spaces, ~ 150 words)

Proposal for ROSAT Observations
General Form

PI

Title First name Middle name Last name

Proposal Title

Coinvestigator(s)

Name	Institution	Country

Institute Endorsement

Name of Administrator

Administrative Authority

Institute

Signature: **Date:**

PI Declaration

I declare that this proposal has been submitted only to:

NASA BMFT SERC (delete TWO agencies)

Signature: **Date:**

Proposal for ROSAT Observations
Target Form

PI			
Title	First name	Middle name	Last name
Proposal Title			

Target	Name			
Target Number	Alternative Name			
Position R.A.		Hour:	Min:	Sec:
J2000 Dec:	Sign:	Deg:	Min:	Sec:

Requested Observing Time (ksec)	Instrument Configuration	
Number of Observations (May be > 1 only with add. constraints)	PSPC	0 = Off
Additional Constraints (Y/N)	HRI	1 = Primary
WFC Zoom On (Y/N)	WFC	2 = Secondary

PSPC Filter Sequence (only if PSPC is chosen)

Filter ID	Percentage Time (to 1%)	Minimum Time (to 0.1 ksec)

WFC Filter Sequence (only if WFC is chosen)

Filter ID	Percentage Time (to 1%)	Minimum Time (to 0.1 ksec)

Remarks

Proposal for ROSAT Observations
Constraints Form

PI			
Title	First name	Middle name	Last name
Proposal Title			
Target Name		Target Number	

Co-ordinated Observation	[ ] Yes	[ ] No		
Start Time Year:	Month:	Day:	Hour:	Min:
Stop Time Year:	Month:	Day:	Hour:	Min:

Monitoring Observations	[ ] Yes	[ ] No
Time Interval between Individual Observations (ksec)		

Phase Dependent Observations	[ ] Yes	[ ] No
Epoch (MJD)	Period (days)	

Contiguous Observation	[ ] Yes	[ ] No
Maximum Number of Data Intervals		

APPENDIX F

VERBOSE HELP FOR VIEWING

1.0 INTRODUCTION:

The program VIEWING is designed to serve mission planning and General Observers for questions having to do with the Rosat orbit, target availability, coincidence with solar system objects, and possibly at some future date, orbit efficiency vis-a-vis percentage of earth blockage, goodness of viewing angles (bright Earth contamination), and time lost to high radiation segments. These later tasks may not be needed here if suitable software is provided by MPE. The primary use for GOs will be if they wish to schedule time critical observations (i.e. simultaneous ground observations or observations at a particular phase of a variable source).

2.0 VIEWING: Scientific Requirements

I Program

This package is intended to be a module embedded in the Mission Information and Planning System. It may contain 4 or more functions, each of which will be an independently callable subroutine: (1) Calculation of the observing window for a given target; (2) Determination of the viewing geometry to estimate the fractional ON time; (3) A listing of solar system objects in the field of view and (4) an evaluation of the availability of guide stars. VIEWING will access the database EPHEM for orbit parameters, solar constraints, South Atlantic Anomoly (SAA) position, positions of the moon and planets, etc. The initial SAO effort will include only (1) and (3).

1) Observing Window

Given a target (RA, DEC) list the dates for which acquisition is possible. The HEAO-2 program for this task was called OBSPLAN. This task will be useful to MP and to proposers who need to make time specific requests (either for coordinating observations at other wavelengths or for anticipating the phase/state of variable sources).

INPUT: RA, DEC, epoch of position, and desired time interval for windows - from the console or from an ASCII file containing a list of positions.

OUTPUT: A table of source name, RA, DEC, and for the specified time interval, dates for the windows during which the source can be observed.

ACCESS: EPHEM for orbit and solar constraint.

2) Predicted ON time per orbit

This task is necessary for MP but will also be of interest to general observers. We attempt to estimate the time lost because of earth blockage ("occultation") and from the shut-down of high voltage during the satellite's passage through the SAA. A secondary product of this option will give details of the viewing geometry which will provide the information necessary to evaluate the

observing efficiency and to estimate the degree of degradation (e.g. increased background) encountered for non-optimal viewing geometries.

INPUT: Target position, date, and number of orbits for integration.

OUTPUT: Percentage of orbit (or secs per orbit) as a function of the two angles, AZ.SES and EP, AZ.SES is the angle between the azimuth of the sun and the azimuth of the satellite as viewed from the center of the earth. It differentiates night from day, acting as a solar clock with noon = 0 deg This knowledge is useful in estimating the amount of scattered solar X-rays for non-optimal viewing (i.e. close to the horizon). EP is the angle between the Earth and the target ("pointing") as viewed from the satellite. It's value is used to calculate earth blockage EP < 90 deg, and to evaluate viewing near the horizon (90 deg < EP < 120 deg).

We contemplate three output formats

a) a table which can be sent to the screen, a printer, or a file for future access;

b) a histogram for screen display or hard copy (input bin edges for EP); and

c) a contour plot on polar coordinates (input contour levels for EP and bin sizes for AZ.SES).

ACCESS: EPHEM for orbit parameters and SAA position.

3) Coincidence with Solar System Objects

A routine check should be made to identify those few occasions when the moon or one of the planets is in the field of view.

INPUT: Target position Date (interval) Radius of Coincidence Circle (RCC)

OUTPUT: The name of the planet (or the moon) which comes within RCC of the target during a visibility window within the specified time interval. Also required are the dates of entering and leaving the coincidence circle, plus the date of closest approach and the distance between object and target at closest approach.

ACCESS: EPHEM for ephemeris of solar system objects.

II. Provisos:

A) Task 2 might be accomplished satisfactorally without incorporating the SAA dropout time for each specific orbit. Since the actual observing date and time will be determined by the Germans, perhaps all we need to know is an average loss from the SAA. On the other hand, it is conceivable that a US observer will require a short observation at a specific phase (e.g. to observe a change of state or an occultation in an X-ray variable) and thus he would need detailed knowledge of the SAA drop-out on an orbit by orbit basis.

B) Ecliptic coordinates may be advisable.

C) When using orbit parameters, we initially need a ground-based estimate which will be used up to launch. Since VIEWING will be used extensively prior to launch, but pertain to times up to a year after launch, a reasonable extrapolation of the predicted orbit must be

available. M. Elvis suggests that a linear approximation is not sufficient and that with model atmospheres, an exponential decay would provide a more accurate extrapolation. This is probably also the case during the mission.

III Future Options

A) It may prove useful to augment the capabilities of (1) the observing window, in order to divide the acquisition interval into TBD subintervals which would be graded according to the available fraction of each orbit, i.e., "poor", < 40 efficiency; "normal", 40 to 60 ; and "good" > 60 Task 2 would be called by task 1 if this option were to be installed.

B) Some "mopping" capability may be advisable: i.e. the ability to produce a time-ordered observing list of US targets automatically selected from the approved target list (OCAT) for a given time interval. This would select on observing window, priority, observing efficiency, focal plane instrument, etc.

C) For "precise" observations of short-time-scale phenomena, it would be useful to know the UT times of observing gaps (e.g. Earth block) and high background (e.g. radiation belts). Output could be a strip chart with horizontal axis = UT time. Successive strips would plot a) phase (user supplied UT of phase zero and period); b) predicted BG rate; and c) on times indicator.

3.0 TARGET VISIBILITY WINDOWS

3.1 General

As was the case for many X-ray satellites, ROSAT will view a band of sky around a great circle perpendicular to the direction of the sun. This is mainly to keep the solar panels within some preset limits (nominally 15 deg) of face-on to the sun, but also keeps the telescope from looking at the sun. For sources near the ecliptic plane, acquisition will thus be possible twice a year for about 4 weeks. For sources near the eccliptic poles, there are no restrictions. VIEWING performs the simple spherical trig. to identify the dates when a source crosses a boundary of this annulus on the sky. It thus requires a solar ephemeris in order to associate solar longitude with date.

3.2 Specification

Convert target position to ecliptic coordinates
(lam is longitude, beta is latitude, and ep is solar constraint)
If abs val(beta)>(90-ep) then source is always visible
Find solar lam for which SST angle (angle between sun and target)
= (90 +/- ep) (i.e. the boundaries of annulus)

For SST = 90 - ep:

dlam1=arccos{[sin(ep)-sin(betat)*sin(betas)]/cos(betat)*cos(betas)}
where betat and betas are the ecliptic latitudes of the target and sun, respectively.

dlam2=360 - dlam1

For SST = 90 + ep

dlam3=arccos{[-sin(ep)-sin(betat)*sin(betas)]/cos(betat)*cos(betas)}

dlam4=360-dlam3

The corresponding solar longitudes are given by:

lam(sun) = lam(target) + dlam(n) (n=1 to 4).

The ephemeris is then used to find the corresponding dates.

Finally, a test is made for each boundary transit to determine if the source is entering or exiting the viewing window. We increment lam(sun) by a small angle and then calculate the sun-target distance:

SST = arccos{sin(betat)*sin(betas)+cos(betat)*cos(betas)*cos(lam(sun+))}

For the lam(sun) found using SST = 90 - ep (the boundaries closest to the sun)
then if SST > (90-ep), the target is entering the window, whereas
if SST < (90-ep), it is exiting the window. For the far side, the conditions are reversed.

3.3 User Specified Parameters

3.3.1 User specifies target position : RA in hr/min/sec and DEC in deg/min/sec
The program converts to radians.
3.3.2 Interval: The time interval for calculating window must be less than or equal to the interval for which solar ephemeri are available. Default will be the entire ephemeris interval. The ephemeris uses day number from some standard day such as 1 Jan 1988, although this is invisible to the user. START.DATE is month day year eg. 2 1 90
STOP.DATE has the same format.
3.3.3 Epoch for input position - For more versatility, the user is allowed to input positions for any epoch, and the program will precess to 1950, which is the epoch for the ephemeri used by viewing.

4.0 COINCIDENCE WITH SOLAR SYSTEM OBJECTS

4.1 General

This option allows the user to determine if the moon or any planet will be in the field of view at a given date, normally within the viewing window. Since venus and mercury never stray far from the sun, and we assume that ROSAT can not point closer than 65 deg from the sun, the inner planets do not figure in the calculations. Likewise, unless a target has an ecliptic latitude less than that of the planet's inclination, they cannot coincide.

4.2 Specification

The user specifies the distance between target and solar system object ("SSO") which would usually be on order of 1 degree for the PSPC, but can be larger for testing or other purposes. This variable is called "sso_cond" in the program, and "Radius of Coincidence Circle" (RCC) for the user interface. The planets & moon are divided into the following latitude groups:

1) pluto = 17.5 deg
2) the moon + pluto = 6 deg
3) the above + saturn, neptune, uranus, mars, jupiter = 2.5 deg For each window, and for each latitude group, check to see if betat (lat of target) < (group lat + sso_cond) If so, then calculate object to target distance for each entry in ephemeris starting at beginning of the target window. If this distance is less than RCC (sso_cond), then print out date and distance. (If not, then continue)

4.3 User parameters

4.3.1 Radius of coincidence circle (sso_cond) is given in degrees, and specifies the distance between target and solar system object which will cause a printed message. Default = 1 degree.

4.3.2 Target Position (as in 3.3.1)

5.0 EXAMPLE

One of our tests for coincidence with Neptune was rigged for a target position known to be close to Neptune in April 1988. We enter RA and Dec in 1988.5 coordinates (the ephemeris gives Neptune's position in epoch of date): 18h 43m 54s, -22d 04' 51". We enter 0.1deg as the radius of the coincidence circle (solar system object constraint), and run from 1 Jan 88 to 31 Dec 88. The output obtained follows.

```
**************************************************************************
TARNAME:neptunec_1apr

          RA          DEC        EPOCH
       18  43  54    -22   4  51     1988.50
       18  41  35    -22  -7 -14     1950.00   279.63  0.98
     INTERVALS FOR WINDOWS

   ENTER              EXIT
  Yr Month   Day     Yr   Month    Day
   88  Mar    15.53    88    Apr    14.91
   88  Sept   17.86    88    Oct    18.33

 The coincidence data for :   neptune

 88   Mar    20.50       88   Apr     0.49( 0.00)     88   Apr    14.91          neptune
**************************************************************************
```

In addition to the two windows, we find that Neptune enters the 0.1deg circle centered on the target on 20.5 Mar, has a closest approach to the target on 0.49 Apr (the number in parenthesis, 0.00, shows how close), and exits the circle sometime after the target leaves the viewing window which ends on 14.91 April. The input parameter file follows:

```
**************************************************************************
! user adjustable parameters
start.date      1 1 88      !mo,day,yr
end.date        12 31 88    !mo,day,yr
ra.pos          18 43 54        !ra in hr,min,sec
dec.pos             -22 04 51       !dec in deg,min,sec
epoch.of.tar        1988.5
sso.cond        0.1         !degrees
tar.name        neptunec_1apr out.
file        test.out
! system parameters follow
coinc.flag      1       !1=>check for coinc; 0=>don't check
epoch.of.ephem      1950.
sol.constraint      15.         !degrees
transit.test    0.5         !degrees
ref.yr          88      !year and day
ephemeris starts. ref.day           1.
```

```
interp.frac      0.1 .01        !fraction of day; 2nd is for moon ONLY!
grp.lat          17.5 6.0 2.5   !degrees
obj.per.grp        1 2 7
!list the names of the sso ephemeris in THIS order.
sol.ephem          viewcal:sun_88_93.ephem
pluto.ephem        viewcal:pluto_88_93.ephem
moon.ephem         viewcal:moon_88_93.ephem
saturn.ephem       viewcal:saturn_88_93.ephem
neptune.ephem      viewcal:neptune_88_93.ephem
uranus.ephem       viewcal:uranus_88_93.ephem
mars.ephem         viewcal:mars_88_93.ephem
jupiter.ephem      viewcal:jupiter_88_93.ephem
*********************************************************************************
```

APPENDIX G

VERBOSE HELP FOR OBSTIME

Table of contents:

1.0 Scientific Requirements

OBSTIME: Scientific Requirements

I. INPUT:
Given an unresolved source, on axis, with following specs: (should have defaults for all)
- A) Spectral: input NH (def = 4.5E19)
  PL: alpha (index of energy spectrum)
  Exp + Gaunt
  Raymond/Smith:
  Black Body:
- B) Boron Filter (PSPC only) (default: negative)
- C) Intensity (Choose one of following inputs, corrected for absorption in our galaxy).
  1) flux in erg/cm^2/sec and band limits in keV.
  2) flux density (erg/cm^2/sec/Hz) & E in keV.
  3) Luminosity & band: requires Ho, qo, & z OR distance
  4) monochromatic luminosity & E "
- D) Excess extended emission def = nil
  give erg/cm^2/s/Hz/sq. arcmin for output bands
- E) Exposure Time OR desired S/N ratio.

II OUTPUT:
- A) Detection If the user specified an exposure time, then the program calculates a S/N. If the user specifies a desired S/N, then the required exposure time is calculated. For user supplied radius of detection circle, and user supplied energy band for PSPC, Centered on the source, produce:
  Total Counts
  BG counts
  Net counts
  +/- error
  sigma = Net/error for specified exposure time, or
  Exposure Time for specified S/N ratio.
- B) Spectral For PSPC, with specified exposure time, give the above 6 quantities for each of 5 energy bands. (The exposure time will be the specified value).

III PROVISOS

Degradation from aspect errors.
Degradation from high background (poor viewing geometry)

IV TECSPEC Requirements

1) PRF (E, r)
   Core
   Wings
   (PSPC and HRI)
2) Effective Area as f(E, r)
   Mirror and PSPC
   Mirror and HRI
3) Background rates (for both detectors)
   f(E, r)

V Future Options

A) Incorporate off-axis parameters
B) Allow for extended sources (Disc or Gaussian user supplied FWHM)
C) Angular Size For a TBD test for conformity with the PRF, what is the confidence level of the statistic?
D) Timing For a user specified EXPosure time (e.g. 1000 s, 5000 s, 10,000 s) divided into 10 bins, what fractional deviation from the mean is necessary for 90% confidence of variability?
E) Position For a user specified EXPosure time, what is the 90% confidence position uncertainty for each detector (with and without aspect error).

2.0 Itemized entries

For each user specified parameter -

Name	Units	Allowed Range	Default	Format/Example
INTENSITY PARAMETERS:				
IC, intensity code	-	LX,LM,FX,SX	LX	string
LX, lum	erg/s	+, <E60	0.0	exp/3.36E45
BIE, band in (pair)	keV	.02<E1<E2<10	0.2, 2.0	real
LM, mono luminosity	cgs	+, <E38	0.0	exp/ 2.5E27
Ee,emitted E	keV	+,.02-10	2.0	real/ 5.2
FX,flux	cgs	+, >E-38	0.0	exp/ 5.67E-13
BIO, band in (pair)	keV	.02<E1<E2<10	0.2, 2.0	real
SX,mono flux	cgs	+, >E-38	0.0	exp/ 3.35E-28
EO,observed E	keV	+,.02-2.5	2.0	real/ 2.1
DISTANCE PARAMETERS:				
DC, distance code	-	DZ,HQZ,DHQ	DZ	string
D, lum dist	parsec	+, <E15	0.0	exponential
z, redshift	-	+, <=15.0*	0.0	real/ 0.60
Ho,hubble const	km/s/Mpc	+,<500.	50.	real
qo,deceler parm	-	+, <100.	0.5	real
SPECTRAL PARAMETERS:				
SC - spectral code	-	PL,EG,RS,BB	PL	string

ALPHA,en index	-	-1 to +5	0.8	real
kT, temperature	keV	+,.02-10	1.0	real/ 3.1
T, temperature	E6 deg K	0.1-199.0	10.0	real/ 23.7
NHS, col den (source)	cm^{-2}	+ <E30	0.0E0	EXPONENTIAL
NHG, col den (galax)	cm^{-2}	+ <E30	4.5E19	exponential
EXPERIMENT PARAMETERS:				
EC, experiment code	-	SN, TIM	TIM	string
EXPTIM, exposure time	ksec	+, <1000	3.0	real
S/N, sig/noise	-	+,	3.0	real
BO, out bands (5 prs)	keV	0.02<E1<E2<2.5	0.1,0.3 0.5,1.0 1.0,2.0	reals
EXBG, excess bg (5)	*	0<EXBG<10000.	0,0,0,0,0	real/ .0035
FPD - focal pl det.	-	PSPC or HRI	PSPC	string
FIL - filter(PSPC only)	-	N or Y	N	string
RAD - radius det circ	arcsec	2-90(even)PSPC 0.5-10.0 HRI	30. 4.	real

****

NOTES:

INTENSITY CODE:

LX=Broad band Luminosity at the source
LM=Monochromatic luminosity at the source
FX=Broad band flux at the Earth
SX=Flux density at the Earth

BIE:

Two energies given in the source reference frame are necessary to define the band for the specified LX.

LM:

Monochromatic luminosity at the source. units = erg/s/Hz

Ee:

The energy Ee is in the source reference frame, used in conjunction with a monochromatic luminosity for specifying source intensity.

BIO:

Two energies given in the observer's reference frame are necessary to define the band for the specified FX.

EO:

Eo is the energy at the earth at which a value of the flux density is specified in order to determine the source intensity.

DISTANCE CODE:

The distance code determines which parameters will determine the source distance (and geometry of the universe!)

DZ: use D (parsec) and z (redshift=0 for galactic objects). These are passed directly to the program.

HQZ: use z, H0, and q0. Calculate the luminosity distance by:

D=[c*E6/H*q*q] * {q*z+(q-1)[sqr(1+2*q*z)-1]} (for q>0)
D=(c*E6*z/H) * (1+z/2) (for q=0)
c=2.99793E5 km/s

DHQ: use D, H, and q. (extragalactic) calculate z:

z=(D*H*q/c*E6) + (q-1)*{1-sqr[(2*D*H/c*E6)+1]} (for q>0)
z= sqr[1+(2DH/c*E6)] -1 (for q=0)

REDSHIFT, z:
If a Raymond-Smith thermal spectrum is used, z<=3.0 instead of <=15.0
This is because our RS tables extend only to 10 keV, and (1+z)*2.5=10 for z=3.

SC - SPECTRAL CODE:
PL=power law; EG=exponential + Gaunt factor; RS=Raymond-Smith, BB=black body

EC:
The experiment code determines which parameter to solve for:
TIM - use obstime and solve for S/N
SN - use the s/n and calculate the required obs time.

EXBG:
Units are cts per 1000 sec per sq arcmin. The user may specify non-zero values for any of the 5 bands defined by BO.

RAD:
For the PSPC, allowed values of radius for the integration circle are 2,4,6,8,...90 arcsec i.e. even values only. For the HRI, they are 0.5, 1.0, 1.5, 2.0, ...10.0 i.e. half arcsec steps upto a maximum of 10 arcsec.

3.0 Program description

3.1 Layout: if user specifies LX or LM, z and spectrum
Shift energy bin boundaries to source frame with (1+z) factor.
Calculate emission spectrum (shape function)
Calculate normalization factor for L and distance (i.e. to Earth)
Modify spectrum shape for absorption at the source.
Shift spectrum back to the observer's frame [1/(1+z)].
Modify spectrum shape for absorption in our galaxy.
Convert to photons
Fold through mirror, (filter), and detector response.
[for PSPC, redistribute photons in energy]
Find fraction of total source photons in given geometrical area.
Add background
Calculate S/N for given exp time, or vice versa.

If user specifies flux or flux density at the Earth, correct for galactic NH when calculating the normalization factor, then convert to photon spectrum etc.

3.2 Generation of Emission Spectra

3.2.1 Power Law:

E is the energy, alpha is the energy power law index, N is the normalization factor, and S(E) is the flux density

S(E)=N*E**-alpha

3.2.2 Exponential + Gaunt

The Gaunt factor is a slowly varying function of E/kT. For the user specified temperature, calculate the flux density for each bin with the following expression (E is the center energy value for each bin):

S(E)=N*G(E/kT)*e**-E/kT

3.2.3 Raymond - Smith Thermal Spectrum

From the RS code, we have generated spectral shapes for temperatures of 0.1 to 200 million K (60 some tables of average flux density in bin width of 0.02 keV between 0.02 and 10 keV. We have assumed 100% cosmic abundances.

3.2.4 Black body spectrum

h is Planck's constant, and c is the velocity of light:

$S(E)= N * [E^3 / (e^{**}E/kt - 1)]$

3.3 Normalization for LX, LM, FX, and SX

We want to end up with a spectrum at the telescope, so we incorporate both the source strength and distance in the normalization factor. Generally, source frame quantities have a subscript "e", while those at the telescope have an "o". The fundamental equation comes from the definition of the Luminosity Distance:

$fo(E1,E2)=[1/4pieD^2] *$ integral Pe dE, with limits E1(1+z), E2(1+z)

where fo is the flux observed at the earth between E1 and E2; Pe is the monochromatic power emitted at the source (which we designate as "LM").

We adopt g(E) as a general spectral shape function, e.g. g(E)=E**-alpha for a power law. The generation of the shape functions have been specified above.

3.3.1 User specifies LX or LM - at the source

We want to fill the red-shifted spectral array with values of ergs/s/keV. The luminosities are defined as:

LM = Ne * g(E) and
LX = Ne * integral[g(E) dE],
where Ne is the normalization constant to be determined. For erg/s/Hz specification of LM, the desired nomalization factor is:

$Ne = LM(Ej)*(2.418E17)/(4pieD^2)*g(Ej)$

where Ej is the energy specified by the user and refers to the energy at the source for which LM is given.

For the case of LX, the broad band luminosity,

$$Ne = L(E1,E2)/(4pieD^2)*integral[g(E)de]$$

where the integral is evaluated over the band specified by the user (in the source's reference frame. Once Ne is obtained, the spectral array which corresponds to 0.02 to 2.50 keV (currently covering (1+z) times this band) is generated by multiplying Ne*g(E). Thence follows the absorption at the source and relabeling the bin edges to shift them back to the Earth.

3.3.2 If the user specifies a flux density at Eo,

$$No = So(Eo) / (g(Eo) * A(Eo))$$

where A(Eo) is the absorption correction at Eo.

3.3.3 If the flux is specified, then:

$$No = f / integral\ [g(E) * A(E)]\ dE,$$

simply integrating from E1 to E2, the user specified band.

3.4 Absorption Corrections

The cross section is generated from 3 coefficients which are a function of energy. The absorption factor is then e**-(cross section * NH)

3.5 Conversion of spectrum to photon spectrum

For each energy bin, we take the flux density * the bin width / E.

3.6 Fold the spectrum through the mirror, [filter], and detector responses.

These steps are simply multiplying bin values by the corresponding attenuation values for the various responses (from TECSPEC database).

3.7 Photon Redistribution for the PSPC

For the PSPC, we need to know how many photons are in each bin or band after the readout of energy. When available from MPE, we will use the PHA redistribution function to generate the equivalent version for our standard energy bins.

3.8 Scattering correction for the PRF

We allow the user to specify a circle size, and the PRF encircled energy function will be used to find the scattering function (as a function of E for the PSPC).

3.9 Background

From TECSPEC, a nominal background per unit area and as a function of energy for the PSPC, will be available. The user may specify excess background rate for the HRI or for the output bands he has chosen for the PSPC.

3.10 S/N and exposure time.

The signal to noise ratio comes from photon statistics:

S/N = (net source cts) / sqrt (net + bk).
Time = $\{[(s/n)^2] * [(\text{source c/s}) + (\text{bk c/s})]\} / (\text{source c/s})^2$

APPENDIX H

Plots of Expected Results from OBSTIME

Appendix H consists of plots showing the total ROSAT counts in the 0.1 - 2.5 keV band as derived from the MIPS OBSTIME program. These plots are intended as examples of the results of running the MIPS OBSTIME program. The plots are shown for the four spectral types: thermal bremsstrahlung, power law, black body, and Raymond-Smith. For each spectral type, there are three plots: one for the HRI counts, one for the PSPC, and one for the PSPC with the boron filter. All plots are for an input flux of

$$FX(0.1 - 2.4 \text{ keV}) = 1*10^{-11} \text{ ergs/cm}^2\text{/second}$$

and an exposure time of 6000 seconds. It should be pointed out that these plots show the flux at the observer being constant. The integration circle radius was 3 arcseconds for the HRI and 10 arcseconds for the PSPC. The four lines on each plot represent four different absorbing column densities:

$$NH=10^{19}, 10^{20}, 10^{21}, \text{ and } 10^{22} \text{ atoms/cm}^{-2}$$

an equivalent column of hydrogen.

APPENDIX I

CHANGES TO MIPS

The following sections of MIPS have changed since the last version.

ACCESS

The ACCESS section has been replaced by three sections: Catalog Access, Mission Information, and Log A Proposal.

Catalog Access now provides the user access to the IPC source and field catalogs. IPC was an instrument on the EINSTEIN satellite. The user may still access the EINSTEIN and EXOSAT catalogs, but there is no longer a universal screen form. If the user wants to do a Cone Search on any of the catalogs, he must select that menu item and then is prompted for the RA, DEC, and radius of the search. Specific searches on the EINSTEIN and EXOSAT catalogs may be performed as before by filling in the desired fields on the respective screen forms. See Section 4 for more details.

Mission Information provides information on ROSAT mission timelines, investigators, schedules, etc. This section is new and the user should refer to Section 5 for information.

LOG A PROPOSAL

Since the Access Subdirectory has been removed the Log A Proposal can now be found on the main menu.

BULLETIN BOARD

The ROSAT Bulletin Board has combined the International and Domestic Bulletin Boards into one general Bulletin Board. Information relating to the mission or to MIPS will be available to the users. Submission of Bulletin Board items has changed. The user no longer can enter the message on the screen form. The message can be entered using the editor or it can be downloaded as in the previous version. See Section 7 for more details.

MIPS MAIL

MIPS mail now has the menu item FixAddress. FixAddress works as it did before, allowing the user to change address or network information. See Section 8 for more details.

OBSTIME

If you are a new user of OBSTIME, you can skip this text and read the other on-line help within OBSTIME (other menuitems) or read the NEW MIPS User's Guide. Users who are familiar with the old OBSTIME should read this message as well as the on-line help in order to avoid confusion in running the new OBSTIME interface.

NOTE: The OBSTIME interface has been changed significantly in response to user comments and requests, and should be much easier to use now. The output files are also easier to read. The following are major changes from the last version of OBSTIME.

o There is only one screenform now. The form has 4 - 6 blank fields to fill out at the top of the form which contain the parameter codes to determine which parameters to place into the table. As a result, the form now only displays the parameters that the user needs to fill out to give the output desired. All parameters displayed are used now. The number of parameters in the table that need values are thus reduced to 7 to 13 maximum.

o The form comes up blank now, since the user determines which parameters the table will contain by the contents of the fields at the top of the form. When the user tabs to the table, the table is filled in with the default values for the parameters needed.

o The program no longer stores the runs in file 1 automatically. To save parameters, the SaveF menuitem must be used. If no input parameter files are obtained from the database, or the current screen of parameters has not been saved, the output file has a file number of 0 attached to the file name.

o The "CopyF" menuitem no longer exists. The "CreateF" menuitem is now called "SaveF". "SaveF" saves the parameters on the screen form to the database. The program no longer makes files with default values as with "CreateF".

o Examine has a new screen form that shows the inputs as well as the outputs for each file on disk. A new menu item has been created that will display all the user's files. The user can cycle through the files by pressing the RETURN key. The default now displays the first run of the first file listed in the "Availfiles" field.

o There is now a "Clear" menu item to clear out all the fields on the screen.

o "Detail" is now accessed by choosing "Help" and then choosing "Technical".

o Examples have been placed into an "Examples" menuitem under "Help". These show example inputs, outputs, output files and a diagram of the screenform with the inputs filled in.

o The "Files in use" field has been replaced by the ListF menuitem. This lists all the files available as well as the filename of the file.

o The GetF, SaveF, and DelF menuitems now show a list of the files available for retrieval, saving, and deleting, respectively.

o "?Descr" will now give a description of the parameter codes in the fields at the top of the form when the cursor is on the field.

o Messages and prompts can now be displayed as popups as well as at the bottom of the screen.

o The "Program", "UserName", "RunDate", "Parameter Type", and "Files in use" fields are no longer on the form.